

THE ASTROPHYSICAL JOURNAL

INDEX TO VOLUME 340, PARTS 1 AND 2

1989 MAY 1 AND MAY 15

- ABBOTT, DAVID C. A Survey of Radio Emission from Galactic OB Stars. *J. H. Bieging, David C. Abbott, and E. B. Churchwell.* **340**, 518, 73-F1 (1989)
- Photospheres of Hot Stars. III. Luminosity Effects at Spectral Type O9.5. *Stephen A. Voels, Bruce Bohannan, David C. Abbott, and D. G. Hummer.* **340**, 1073, 81-F1 (1989)
- ALLAMANDOLA, L. J. Infrared Emission from Comets. *K. S. Krishna Swamy, S. A. Sandford, L. J. Allamandola, F. C. Witteborn, and J. D. Bregman.* **340**, 537, 73-G11 (1989)
- ANTONUCCI, ROBERT. Millimeter, Centimeter, and Carbon Monoxide Observations of Radio-quiet Quasars and Luminous Seyfert 1 Galaxies Detected by IRAS (Abstract of Paper in 1989 June Suppl.). *Richard Barvainis and Robert Antonucci.* **340**, 1144, 82-E1 (1989)
- APPLEGATE, JAMES H. Hydrogen as a Test of Type Ia Supernova Progenitor Models. *James H. Applegate and James L. Terman.* **340**, 380, 72-A5 (1989)
- ARNETT, W. DAVID. The Late Behavior of Supernova 1987A. I. The Light Curve. *W. David Arnett and Albert Fu.* **340**, 396, 72-B10 (1989)
- The Late Behavior of Supernova 1987A. II. Gamma-Ray Transparency of the Ejecta. *Albert Fu and W. David Arnett.* **340**, 414, 72-D1 (1989)
- ATTEIA, J.-L. Gamma-Ray Burst Counterparts: Radio. *Bradley E. Schaefer, Thomas L. Cline, J.-L. Atteia, C. Barat, U. D. Desai, I. V. Estulin, W. D. Evans, E. E. Fenimore, K. Hurley, R. W. Klebesadel, A. V. Kuznetsov, J. G. Laros, N. Niel, and B. J. Teegarden.* **340**, 455, 72-G9 (1989)
- BAAN, W. A. VLBI Observations of the OH Megamaser in IC 4553 (Arp 220). *P. J. Diamond, R. P. Norris, W. A. Baan, and R. S. Booth.* **340**, L49, 83-B1 (1989)
- BAGOLY, Z. High-Energy Gamma-Ray Absorption in Relativistic Magnetospheres. *H. Riffert, P. Mészáros, and Z. Bagoly.* **340**, 443, 72-F8 (1989)
- BARAT, C. Gamma-Ray Burst Counterparts: Radio. *Bradley E. Schaefer, Thomas L. Cline, J.-L. Atteia, C. Barat, U. D. Desai, I. V. Estulin, W. D. Evans, E. E. Fenimore, K. Hurley, R. W. Klebesadel, A. V. Kuznetsov, J. G. Laros, N. Niel, and B. J. Teegarden.* **340**, 455, 72-G9 (1989)
- BARKER, TIMOTHY. The Ionization Structure of Planetary Nebulae. IX. NGC 1535. *Timothy Barker.* **340**, 921, 79-G7 (1989)
- BARNES, JOSHUA E. Error Analysis of a Tree Code (Abstract of Paper in 1989 June Suppl.). *Joshua E. Barnes and Piet Hut.* **340**, 1145, 82-E2 (1989)
- BARVAINIS, RICHARD. Millimeter, Centimeter, and Carbon Monoxide Observations of Radio-quiet Quasars and Luminous Seyfert 1 Galaxies Detected by IRAS (Abstract of Paper in 1989 June Suppl.). *Richard Barvainis and Robert Antonucci.* **340**, 1144, 82-E1 (1989)
- BATCHELOR, DAVID. The Spatial Scales and Rise Times of Impulsive Solar Burst Sources. *David Batchelor.* **340**, 607, 74-F11 (1989)
- BAUSCHLICHER, CHARLES W., JR. Theoretical Study of the Dipole Moment Function of the $X^2\Sigma^+$ State of CN. *Stephen R. Langhoff and Charles W. Bauschlicher, Jr.* **340**, 620, 75-A1 (1989)
- BEERS, TIMOTHY. C. Evidence for Clustering of Field Horizontal-Branch Stars in the Galactic Halo. *Steve P. Doinidis and Timothy Beers.* **340**, L57, 83-B10 (1989)
- BENNETT, A. Deuterium Fractionation in Dense Interstellar Clouds. *T. J. Millar, A. Bennett, and Eric Herbst.* **340**, 906, 79-F1 (1989)
- BEREZINSKY, V. S. Diffusive Shock Acceleration of Cosmic Rays and Gamma Radiation from Young Supernova Shells. *V. S. Berezinsky and V. S. Pustkin.* **340**, 351, 71-D6 (1989)
- BERTSCHINGER, EDMUND. The Evolution of Cooling Flows: Self-similar Cooling Waves. *Edmund Bertschinger.* **340**, 666, 76-F7 (1989)
- BHAVSAR, SUKETU P. The Topology of Large-Scale Structure. III. Analysis of Observations. *J. Richard Gott III, John Miller, Trinh X. Thuan, Stephen E. Schneider, David H. Weinberg, Charles Gammie, Kevin Polk, Michael Vogeley, Scott Jeffrey, Suketu P. Bhavsar, Adrian L. Melott, Riccardo Giovanelli, Martha P. Haynes, R. Brent Tully, and Andrew J. S. Hamilton.* **340**, 625, 76-C1 (1989)
- The Area of Isodensity Contours in Cosmological Models and Galaxy Surveys. *Barbara S. Ryden, Adrian L. Melott, David A. Craig, J. Richard Gott III, David H. Weinberg, Robert J. Scherrer, Suketu P. Bhavsar, and John M. Miller.* **340**, 647, 76-E1 (1989)
- BIEGING, J. H. A Survey of Radio Emission from Galactic OB Stars. *J. H. Bieging, David C. Abbott, and E. B. Churchwell.* **340**, 518, 73-F1 (1989)
- BIRETTA, J. A. Superluminal Motion in the Quasar 3C 279. *S. C. Unwin, M. H. Cohen, J. A. Biretta, M. W. Hodges, and J. A. Zensus.* **340**, 117, 68-E6 (1989)
- BLACK, JOHN H. Interstellar C_2 , CH, and CN in Translucent Molecular Clouds. *Ewine F. van Dishoeck and John H. Black.* **340**, 273, 70-D10 (1989)
- BLAIR, WILLIAM P. Discovery of Optical Emission from the Remnant of SN 1957D in M83. *Knox S. Long, William P. Blair, and Wojciech Krzeminski.* **340**, L25, 75-E4 (1989)
- BLUDMAN, SIDNEY A. Neutrino Transport and the Prompt Mechanism for Type II Supernovae. *Eric S. Myra and Sidney A. Bludman.* **340**, 384, 72-A9 (1989)
- BOHANNAN, BRUCE. Photospheres of Hot Stars. III. Luminosity Effects at Spectral Type O9.5. *Stephen A. Voels, Bruce Bohannan, David C. Abbott, and D. G. Hummer.* **340**, 1073, 81-F1 (1989)
- BOOTH, R. S. VLBI Observations of the OH Megamaser in IC 4553 (Arp 220). *P. J. Diamond, R. P. Norris, W. A. Baan, and R. S. Booth.* **340**, L49, 83-B1 (1989)
- BOTHUN, GREGORY D. The Wasilewski Sample of Emission-Line Galaxies: Follow-up CCD Imaging and Spectroscopic and IRAS Observations (Abstract of Paper in 1989 June Suppl.). *Gregory D. Bothun, Jules P. Halpern, Carol J. Lonsdale, Chris Impey, and Mark Schmitz.* **340**, 1144, 82-E1 (1989)
- BOWERS, P. F. Envelope Structures and Optical/Radio Positions of Cool Stars. *P. F. Bowers, K. J. Johnston, and C. de Vegt.* **340**, 479, 73-C1 (1989)
- BRANDI, ESTELA. An Interpretation of the Line Profile Variations in the IUE Spectrum of the Wolf-Rayet Binary γ_2 Velorum. *Estela Brandi, Osvaldo E. Ferrer, and Jorge Sahade.* **340**, 1091, 81-G6 (1989)
- BRAUN, ROBERT. Three Fields Containing Young Pulsars: The Observable Lifetime of Supernova Remnants. *Robert Braun, W. Miller Goss, and Andrew G. Lyne.* **340**, 355, 71-D11 (1989)
- BREGMAN, J. D. Infrared Emission from Comets. *K. S. Krishna Swamy, S. A. Sandford, L. J. Allamandola, F. C. Witteborn, and J. D. Bregman.* **340**, 537, 73-G11 (1989)
- BROWN, L. M. J. Multifrequency Observations of Blazars. III. The Spectral Shape of the Radio to X-Ray Continuum. *L. M. J. Brown, E. I. Robson, W. K. Gear, D. H. Hughes, M. J. Griffin, B. J. Geldzahler, P. R. Schwartz, M. G. Smith, A. G. Smith, D. W. Shepherd, J. R. Webb, E. Valtaoja, H. Terasanta, and E. Salonen.* **340**, 129, 68-F8 (1989)
- Multifrequency Observations of Blazars. IV. The Variability of the Radio to Ultraviolet Continuum. *L. M. J. Brown, E. I. Robson, W. K. Gear, and M. G. Smith.* **340**, 150, 69-A2 (1989)
- BRUENN, STEPHEN W. The Prompt-Shock Supernova Mechanism. I. The Effect of the Free-Proton Mass Fraction and the Neutrino Transport Algorithm. *Stephen W. Bruenn.* **340**, 955, 80-C1 (1989)
- BRUHWEILER, FREDERICK C. Highly Ionized Species and Circumstellar Shells in B8-A1 Stars. *Frederick C. Bruhweiler, C. A. Grady, and Weihsueh A. Chiu.* **340**, 1038, 81-C1 (1989)
- BURROWS, D. N. Observational Constraints on an Embedded Cloud Model for the Soft X-Ray Diffuse Background. *D. N. Burrows.* **340**, 775, 78-B3 (1989)
- CAMPBELL, BEL. Radio Emission from Symbiotic Variables: CI Cygni, Z Andromedae, and EG Andromedae—Temporal Variability as Clues to the Nature of Symbiotics. *Michael V. Torbett and Bel Campbell.* **340**, L73, 83-D1 (1989)

- CAPUTO, F. The "Red Giant Clock" as an Indicator for the Efficiency of Central Mixing in Horizontal-Branch Stars. *F. Caputo, V. Castellani, A. Chieffi, L. Pulone, and A. Tornambé.* **340**, 241, 70-A10 (1989)
- CARLBERG, R. G. Mergers and Bias in a Cold Dark Matter Cosmology. *R. G. Carlberg and H. M. P. Couchman.* **340**, 47, 67-E7 (1989)
- CASTELLANI, V. The "Red Giant Clock" as an Indicator for the Efficiency of Central Mixing in Horizontal-Branch Stars. *F. Caputo, V. Castellani, A. Chieffi, L. Pulone, and A. Tornambé.* **340**, 241, 70-A10 (1989)
- CAULET, ADELINE. The Evolution of Low-Ionization QSO Absorption Systems. *Adeline Caulet.* **340**, 90, 68-B9 (1989)
- CAVALIERE, A. The Connection between Active and Normal Galaxies. *A. Cavaliere and P. Padovani.* **340**, 15, 75-C11 (1989)
- CHENG, JIU-HENG. An Analysis on the Precession of the Accretion Disk on Hercules X-1. *Guo-jun Qiao and Jiu-heng Cheng.* **340**, 503, 73-D11 (1989)
- CHENG, YE. Resonance Excitation of Spiral Density Waves in a Gaseous Disk. I. A Linear Theory. *Chi Yuan and Ye Cheng.* **340**, 216, 69-F11 (1989)
- CHIEFFI, A. The "Red Giant Clock" as an Indicator for the Efficiency of Central Mixing in Horizontal-Branch Stars. *F. Caputo, V. Castellani, A. Chieffi, L. Pulone, and A. Tornambé.* **340**, 241, 70-A10 (1989)
- CHIU, WEHSUEH A. Highly Ionized Species and Circumstellar Shells in B8-A1 Stars. *Frederick C. Bruhweiler, C. A. Grady, and Wehsueh A. Chiu.* **340**, 1038, 81-C1 (1989)
- CHURCHWELL, E. B. A Survey of Radio Emission from Galactic OB Stars. *J. H. Bieging, David C. Abbott, and E. B. Churchwell.* **340**, 518, 73-F1 (1989)
- CHURCHWELL, ED. Massive Stars Embedded in Molecular Clouds: Their Population and Distribution in the Galaxy. *Douglas O. S. Wood and Ed Churchwell.* **340**, 265, 70-C10 (1989)
- CLAYTON, DONALD D. Origin of Heavy Xenon in Meteoritic Diamonds. *Donald D. Clayton.* **340**, 613, 74-G5 (1989)
- Stochastic Evolution of Refractory Interstellar Dust during the Chemical Evolution of a Two-Phase Interstellar Medium. *Kurt Liffman and Donald D. Clayton.* **340**, 853, 79-B1 (1989)
- CLINE, THOMAS L. Gamma-Ray Burster Counterparts: Radio. *Bradley E. Schaefer, Thomas L. Cline, J.-L. Atteia, C. Barat, U. D. Desai, I. V. Estulin, W. D. Evans, E. E. Fenimore, K. Hurley, R. W. Klebesadel, A. V. Kuznetsov, J. G. Laros, N. Niel, and B. J. Teegarden.* **340**, 455, 72-G9 (1989)
- COHEN, M. H. Superluminal Motion in the Quasar 3C 279. *S. C. Unwin, M. H. Cohen, J. A. Biretta, M. W. Hodges, and J. A. Zensus.* **340**, 117, 68-E6 (1989)
- COLAVITA, M. M. Angular Diameter Measurements of 24 Giant and Supergiant Stars from the Mark III Optical Interferometer. *D. J. Hutter, K. J. Johnston, D. Mozurkewich, R. S. Simon, M. M. Colavita, X. P. Pan, M. Shao, B. E. Hines, D. H. Staelin, J. L. Hershey, J. A. Hughes, and G. H. Kaplan.* **340**, 1103, 82-A5 (1989)
- COOK, J. W. Solar Si III Line Ratios from the High-Resolution Telescope and Spectrograph on Board *Spacelab 2*: The Effects of Non-Maxwellian Electron Distribution Function. *F. P. Keenan, J. W. Cook, P. L. Dufton, and A. E. Kingston.* **340**, 1135, 82-D1 (1989)
- CORBELLI, EDVIGE. Extragalactic Jets as Current Carrying Systems. II. Magnetohydrodynamic Turbulence, Relativistic Electron Distribution, and Observable Quantities. *Edvige Corbelli and Pierluigi Veltri.* **340**, 679, 76-G7 (1989)
- CORNWELL, T. J. High-Resolution, High Dynamic Range VLA Images of the M87 Jet at 2 Centimeters. *Frazer N. Owen, Philip E. Hardee, and T. J. Cornwell.* **340**, 698, 77-B1 (1989)
- COUCHMAN, H. M. P. Mergers and Bias in a Cold Dark Matter Cosmology. *R. G. Carlberg and H. M. P. Couchman.* **340**, 47, 67-E7 (1989)
- CRAIG, DAVID A. The Area of Isodensity Contours in Cosmological Models and Galaxy Surveys. *Barbara S. Ryden, Adrian L. Melott, David A. Craig, J. Richard Gott III, David H. Weinberg, Robert J. Scherrer, Suketu P. Bhavsar, and John M. Miller.* **340**, 647, 76-E1 (1989)
- CUTRI, R. M. The Properties of Infrared Color-selected Quasars. *F. J. Low, R. M. Cutri, S. G. Kleinmann, and J. P. Huchra.* **340**, 11, 75-C6 (1989)
- DALGARNO, A. Fast Molecular Shocks. I. Re-formation of Molecules behind a Dissociative Shock. *David A. Neufeld and A. Dalgarno.* **340**, 869, 79-C3 (1989)
- DE BERNARDIS, PAOLO. Extragalactic Infrared Backgrounds, Polarization, and Universal Magnetic Field. *Paolo de Bernardis, Silvia Masi, Francesco Melchiorri, and Giovanni Moreno.* **340**, 145, 83-A10 (1989)
- DEGUCHI, SHUJI. Interacting Masers and the Extreme Brightness of Astrophysical Water Masers. *Shuji Deguchi and William D. Watson.* **340**, 117, 75-D11 (1989)
- DEKEL, AVISHAI. The Clustering of Dwarf Galaxies. *Jo Ann Eder, James M. Schombert, Avishai Dekel, and Augustus Oemler, Jr.* **340**, 29, 67-C10 (1989)
- DERE, KENNETH P. Turbulent Power and Dissipation in the Solar Transition Zone. *Kenneth P. Dere.* **340**, 599, 74-F1 (1989)
- DESAI, U. D. Gamma-Ray Burster Counterparts: Radio. *Bradley E. Schaefer, Thomas L. Cline, J.-L. Atteia, C. Barat, U. D. Desai, I. V. Estulin, W. D. Evans, E. E. Fenimore, K. Hurley, R. W. Klebesadel, A. V. Kuznetsov, J. G. Laros, N. Niel, and B. J. Teegarden.* **340**, 455, 72-G9 (1989)
- DE VEGT, C. Envelope Structures and Optical/Radio Positions of Cool Stars. *P. F. Bowers, K. J. Johnston, and C. de Vegt.* **340**, 479, 73-C1 (1989)
- DEVEREUX, NICHOLAS A. A Reevaluation of the Infrared-Radio Correlation for Spiral Galaxies. *Nicholas A. Devereux and Stephen A. Eales.* **340**, 708, 77-C1 (1989)
- DE VILLE, A. The Nonuniform Magnetohydrodynamic Nature of the Solar Corona. II. Generalization of Basic Solutions. *A. de Ville and E. R. Priest.* **340**, 579, 74-D5 (1989)
- DIAMOND, P. J. VLBI Observations of the OH Megamaser in IC 4553 (Arp 220). *P. J. Diamond, R. P. Norris, W. A. Baan, and R. S. Booth.* **340**, 149, 83-B1 (1989)
- D'ODORICO, SANDRO. Million Degree Gas in the Galactic Halo and the Large Magellanic Cloud. II. The Line of Sight to SN 1987A. *Max Pettini, Raylee Stathakis, Sandro D'Odorico, Paolo Molaro, and Giovanni Vladilo.* **340**, 256, 70-C1 (1989)
- DOINIDIS, STEVE P. Evidence for Clustering of Field Horizontal-Branch Stars in the Galactic Halo. *Steve P. Doinidis and Timothy Beers C.* **340**, 157, 83-B10 (1989)
- DUFTON, P. L. Solar Si III Line Ratios from the High-Resolution Telescope and Spectrograph on Board *Spacelab 2*: The Effects of Non-Maxwellian Electron Distribution Function. *F. P. Keenan, J. W. Cook, P. L. Dufton, and A. E. Kingston.* **340**, 1135, 82-D1 (1989)
- DUNCAN, W. D. Submillimeter Measurements of T Tauri and FU Orionis Stars. *David A. Weintraub, G. Sandell, and W. D. Duncan.* **340**, 169, 83-C10 (1989)
- DWEK, ELI. Mystery Spot in Supernova 1987A: Reflection or Fluorescence by an Interstellar Cloud? *James E. Felten, Eli Dwek, and Sueli M. Viegas-Aldrovandi.* **340**, 943, 80-B2 (1989)
- EALLES, STEPHEN A. A Reevaluation of the Infrared-Radio Correlation for Spiral Galaxies. *Nicholas A. Devereux and Stephen A. Eales.* **340**, 708, 77-C1 (1989)
- EBISUZAKI, TOSHIKAZU. Gamma-Ray Lines Produced by Low-Energy Cosmic Rays in SN 1987A. *Toshikazu Ebisuzaki, Yoshiyuki Takahashi, and Noriaki Shibasaki.* **340**, 950, 80-B9 (1989)
- EDER, JO ANN. The Clustering of Dwarf Galaxies. *Jo Ann Eder, James M. Schombert, Avishai Dekel, and Augustus Oemler, Jr.* **340**, 29, 67-C10 (1989)
- EDGAR, RICHARD J. The Density Distribution of Refractory Elements Away from the Galactic Plane. *Richard J. Edgar and Blair D. Savage.* **340**, 762, 78-A1 (1989)
- ELMEGREEN, BRUCE G. On the Gravitational Collapse of Decelerating Shocked Layers in OB Associations. *Bruce G. Elmegreen.* **340**, 786, 78-C1 (1989)
- ENGLEMAN, ROLF, JR. The Structure and Wavelength of Some Pt II Lines of Astrophysical Interest. *Rolf Engleman, Jr.* **340**, 1140, 82-D6 (1989)
- ESTULIN, I. V. Gamma-Ray Burster Counterparts: Radio. *Bradley E. Schaefer, Thomas L. Cline, J.-L. Atteia, C. Barat, U. D. Desai, I. V. Estulin, W. D. Evans, E. E. Fenimore, K. Hurley, R. W. Klebesadel, A. V. Kuznetsov, J. G. Laros, N. Niel, and B. J. Teegarden.* **340**, 455, 72-G9 (1989)
- EVANS, NEAL J., II. A Reexamination of the Energetics of Molecular Clouds. *Yuefang Wu and Neal J. Evans II.* **340**, 307, 70-G5 (1989)
- EVANS, W. D. Gamma-Ray Burster Counterparts: Radio. *Bradley E. Schaefer, Thomas L. Cline, J.-L. Atteia, C. Barat, U. D. Desai, I. V. Estulin, W. D. Evans, E. E. Fenimore, K. Hurley, R. W. Klebesadel, A. V. Kuznetsov, J. G. Laros, N. Niel, and B. J. Teegarden.* **340**, 455, 72-G9 (1989)
- FELTEN, JAMES E. Mystery Spot in Supernova 1987A: Reflection or Fluorescence by an Interstellar Cloud? *James E. Felten, Eli Dwek, and Sueli M. Viegas-Aldrovandi.* **340**, 943, 80-B2 (1989)
- FENIMORE, E. E. Gamma-Ray Burster Counterparts: Radio. *Bradley E. Schaefer, Thomas L. Cline, J.-L. Atteia, C. Barat, U. D. Desai, I. V. Estulin, W. D. Evans, E. E. Fenimore, K. Hurley, R. W. Klebesadel, A. V. Kuznetsov, J. G. Laros, N. Niel, and B. J. Teegarden.* **340**, 455, 72-G9 (1989)
- FERRER, OSVALDO E. An Interpretation of the Line Profile Variations in the IUE Spectrum of the Wolf-Rayet Binary γ_2 Velorum. *Estela Brandi, Osvaldo E. Ferrer, and Jorge Sahade.* **340**, 1091, 81-G6 (1989)
- FILIPPENKO, ALEXEI V. Bowen Fluorescence in Scorpius X-1. *Jonathan Schachter, Alexei V. Filippenko, and Steven M. Kahn.* **340**, 1049,

- 81-D1 (1989)
- FLEMING, THOMAS A. The Relation between X-Ray Emission and Rotation in Late-Type Stars from the Perspective of X-Ray Selection. *Thomas A. Fleming, Isabella M. Gioia, and Tommaso Maccacaro.* **340**, 1011, 80-G8 (1989)
- FREEDMAN, WENDY L. Photographic, Near-Infrared, and CCD Photometry of the Distant Globular Cluster AM-1. *Barry F. Madore and Wendy L. Freedman.* **340**, 812, 78-E1 (1989)
- FRY, J. N. Void Statistics, Scaling, and the Origins of Large-Scale Structure. *J. N. Fry, Riccardo Giovanelli, Martha P. Haynes, Adrian L. Melott, and Robert J. Scherrer.* **340**, 11, 67-B4 (1989)
- FU, ALBERT. The Late Behavior of Supernova 1987A. I. The Light Curve. *W. David Arnett and Albert Fu.* **340**, 396, 72-B10 (1989)
- The Late Behavior of Supernova 1987A. II. Gamma-Ray Transparency of the Ejecta. *Albert Fu and W. David Arnett.* **340**, 414, 72-D1 (1989)
- GAMMIE, CHARLES. The Topology of Large-Scale Structure. III. Analysis of Observations. *J. Richard Gott III, John Miller, Trinh X. Thuan, Stephen E. Schneider, David H. Weinberg, Charles Gammie, Kevin Polk, Michael Vogeley, Scott Jeffrey, Suketu P. Bhavsar, Adrian L. Melott, Riccardo Giovanelli, Martha P. Haynes, R. Brent Tully, and Andrew J. S. Hamilton.* **340**, 625, 76-C1 (1989)
- GARDNER, F. F. Detection of the $2_0 \rightarrow 3_1$ Transition of $^{13}\text{CH}_3\text{OH}$ at 14.8 GHz. *T. B. H. Kuiper, W. L. Peters III, F. F. Gardner, J. B. Whiteoak, and J. E. Reynolds.* **340**, L41, 75-F9 (1989)
- GEAR, W. K. Multifrequency Observations of Blazars. III. The Spectral Shape of the Radio to X-Ray Continuum. *L. M. J. Brown, E. I. Robson, W. K. Gear, D. H. Hughes, M. J. Griffin, B. J. Geldzahler, P. R. Schwartz, M. G. Smith, A. G. Smith, D. W. Shepherd, J. R. Webb, E. Valtaoja, H. Terasranta, and E. Salonen.* **340**, 129, 68-F8 (1989)
- Multifrequency Observations of Blazars. IV. The Variability of the Radio to Ultraviolet Continuum. *L. M. J. Brown, E. I. Robson, W. K. Gear, and M. G. Smith.* **340**, 150, 69-A2 (1989)
- GEBALLE, T. R. An Infrared Study of Starbursts in the Interacting Galaxy Pair Arp 299 (NGC 3690 + IC 694). *Takao Nakagawa, Tetsuya Nagata, T. R. Geballe, Haruyuki Okuda, Hiroshi Shibai, and Hideo Matsuhara.* **340**, 729, 77-E1 (1989)
- Unusual Features of the 1-4 Micron Spectrum of HR 4049. *T. R. Geballe, K. S. Noll, D. C. B. Whittet, and L. B. F. M. Waters.* **340**, L29, 75-E9 (1989)
- GELDZAHLER, B. J. Multifrequency Observations of Blazars. III. The Spectral Shape of the Radio to X-Ray Continuum. *L. M. J. Brown, E. I. Robson, W. K. Gear, D. H. Hughes, M. J. Griffin, B. J. Geldzahler, P. R. Schwartz, M. G. Smith, A. G. Smith, D. W. Shepherd, J. R. Webb, E. Valtaoja, H. Terasranta, and E. Salonen.* **340**, 129, 68-F8 (1989)
- GENZEL, R. First Detection of SO_2 and CH_3OH Emission and One Unidentified Line near 800 GHz. *J. Stutzki, R. Genzel, U. U. Graf, A. I. Harris, and D. T. Jaffe.* **340**, L37, 75-F5 (1989)
- GHISELLINI, GABRIELE. Bulk Acceleration in Relativistic Jets and the Spectral Properties of Blazars. *Gabriele Ghisellini and Laura Maraschi.* **340**, 181, 69-C13 (1989)
- GIOIA, ISABELLA M. The Relation between X-Ray Emission and Rotation in Late-Type Stars from the Perspective of X-Ray Selection. *Thomas A. Fleming, Isabella M. Gioia, and Tommaso Maccacaro.* **340**, 1011, 80-G8 (1989)
- GIOVANELLI, RICCARDO. Void Statistics, Scaling, and the Origins of Large-Scale Structure. *J. N. Fry, Riccardo Giovanelli, Martha P. Haynes, Adrian L. Melott, and Robert J. Scherrer.* **340**, 11, 67-B4 (1989)
- The Topology of Large-Scale Structure. III. Analysis of Observations. *J. Richard Gott III, John Miller, Trinh X. Thuan, Stephen E. Schneider, David H. Weinberg, Charles Gammie, Kevin Polk, Michael Vogeley, Scott Jeffrey, Suketu P. Bhavsar, Adrian L. Melott, Riccardo Giovanelli, Martha P. Haynes, R. Brent Tully, and Andrew J. S. Hamilton.* **340**, 625, 76-C1 (1989)
- GOODRICH, ROBERT W. Spectropolarimetry and Variability of Seyfert 1.8 and 1.9 Galaxies. *Robert W. Goodrich.* **340**, 190, 69-D10 (1989)
- GOSS, W. M. VLA Observations of Circumnebular Neutral Hydrogen in IC 418. *A. R. Taylor, G. T. Gussie, and W. M. Goss.* **340**, 932, 80-A6 (1989)
- GOSS, W. MILLER. Three Fields Containing Young Pulsars: The Observable Lifetime of Supernova Remnants. *Robert Braun, W. Miller Goss, and Andrew G. Lyne.* **340**, 355, 71-D11 (1989)
- GOTT, J. RICHARD. III. The Topology of Large-Scale Structure. III. Analysis of Observations. *J. Richard Gott III, John Miller, Trinh X. Thuan, Stephen E. Schneider, David H. Weinberg, Charles Gammie, Kevin Polk, Michael Vogeley, Scott Jeffrey, Suketu P. Bhavsar, Adrian L. Melott, Riccardo Giovanelli, Martha P. Haynes, R. Brent Tully, and Andrew J. S. Hamilton.* **340**, 625, 76-C1 (1989)
- The Area of Isodensity Contours in Cosmological Models and Galaxy Surveys. *Barbara S. Ryden, Adrian L. Melott, David A. Craig, J. Richard Gott III, David H. Weinberg, Robert J. Scherrer, Suketu P. Bhavsar, and John M. Miller.* **340**, 647, 76-E1 (1989)
- GRADY, C. A. Highly Ionized Species and Circumstellar Shells in B8-A1 Stars. *Frederick C. Bruhweiler, C. A. Grady, and Weihseh A. Chiu.* **340**, 1038, 81-C1 (1989)
- GRAF, U. U. First Detection of SO_2 and CH_3OH Emission and One Unidentified Line near 800 GHz. *J. Stutzki, R. Genzel, U. U. Graf, A. I. Harris, and D. T. Jaffe.* **340**, L37, 75-F5 (1989)
- GREENBERG, J. MAYO. The Temperature Dependence of the CO Infrared Band Strength in CO: H_2O Ices. *B. Schmitt, J. Mayo Greenberg, and R. J. A. Grim.* **340**, L33, 75-F1 (1989)
- GRIFFIN, M. J. Multifrequency Observations of Blazars. III. The Spectral Shape of the Radio to X-Ray Continuum. *L. M. J. Brown, E. I. Robson, W. K. Gear, D. H. Hughes, M. J. Griffin, B. J. Geldzahler, P. R. Schwartz, M. G. Smith, A. G. Smith, D. W. Shepherd, J. R. Webb, E. Valtaoja, H. Terasranta, and E. Salonen.* **340**, 129, 68-F8 (1989)
- GRIFFITH, CAITLIN A. Erosion of Circumstellar Particle Disks by Interstellar Dust. *Jack J. Lissauer and Caitlin A. Griffith.* **340**, 468, 73-B1 (1989)
- GRIM, R. J. A. The Temperature Dependence of the CO Infrared Band Strength in CO: H_2O Ices. *B. Schmitt, J. Mayo Greenberg, and R. J. A. Grim.* **340**, L33, 75-F1 (1989)
- GUDEHUS, DONALD H. A Search for Diffuse Light in a Richness 4 Cluster of Galaxies. *Donald H. Gudehus.* **340**, 661, 76-F1 (1989)
- GUHATHAKURTA, P. Interstellar Matter in Early-Type Galaxies. I. IRAS Flux Densities (Abstract of Paper in 1989 June Suppl.). *G. R. Knapp, P. Guhathakurta, D.-W. Kim, and M. Jura.* **340**, 1145, 82-E2 (1989)
- GUPTA, M. The Abundances of ^{14}N in the Cosmic-Ray Source: A Study Using New Fragmentation Cross Sections. *M. Gupta and W. R. Webber.* **340**, 1124, 82-C1 (1989)
- GUSSIE, G. T. VLA Observations of Circumnebular Neutral Hydrogen in IC 418. *A. R. Taylor, G. T. Gussie, and W. M. Goss.* **340**, 932, 80-A6 (1989)
- HACHISU, IZUMI. Stellar Wind during Helium Nova Outburst. *Mariko Kato, Hideyuki Saio, and Izumi Hachisu.* **340**, 509, 73-E5 (1989)
- HALPERN, JULES P. The Wasilewski Sample of Emission-Line Galaxies: Follow-up CCD Imaging and Spectroscopic and IRAS Observations (Abstract of Paper in 1989 June Suppl.). *Gregory D. Bothun, Jules P. Halpern, Carol J. Lonsdale, Chris Impey, and Mark Schmitz.* **340**, 1144, 82-E1 (1989)
- HAMILTON, ANDREW J. S. The Topology of Large-Scale Structure. III. Analysis of Observations. *J. Richard Gott III, John Miller, Trinh X. Thuan, Stephen E. Schneider, David H. Weinberg, Charles Gammie, Kevin Polk, Michael Vogeley, Scott Jeffrey, Suketu P. Bhavsar, Adrian L. Melott, Riccardo Giovanelli, Martha P. Haynes, R. Brent Tully, and Andrew J. S. Hamilton.* **340**, 625, 76-C1 (1989)
- HAMUY, M. A. see PENNYPACKER, C. R., et al.
- HANKINS, D. J. Discovery of Broad-Band Optical Circular Polarization in Alpha Leonis. *G. D. Henson, J. C. Kemp, D. J. Kraus, and D. J. Hankins.* **340**, L65, 83-C5 (1989)
- HARDEE, PHILIP E. High-Resolution, High Dynamic Range VLA Images of the M87 Jet at 2 Centimeters. *Frazer N. Owen, Philip E. Hardee, and T. J. Cornwell.* **340**, 698, 77-B1 (1989)
- HARRIS, A. I. First Detection of SO_2 and CH_3OH Emission and One Unidentified Line near 800 GHz. *J. Stutzki, R. Genzel, U. U. Graf, A. I. Harris, and D. T. Jaffe.* **340**, L37, 75-F5 (1989)
- HASEGAWA, TETSUO. Velocity Field in the Fragmented Molecular Cloud Core of W3: Evidence for Large-Scale Turbulence. *Masahiko Hayashi, Hideyuki Kobayashi, and Tetsuo Hasegawa.* **340**, 298, 70-F10 (1989)
- HASINGER, G. Detection of a Strong Excess Noise Component in the Low State of 4U 1705 - 44. *A. Langmeier, G. Hasinger, and J. Trümper.* **340**, L21, 75-E1 (1989)
- HAYASHI, MASAHIKO. Velocity Field in the Fragmented Molecular Cloud Core of W3: Evidence for Large-Scale Turbulence. *Masahiko Hayashi, Hideyuki Kobayashi, and Tetsuo Hasegawa.* **340**, 298, 70-F10 (1989)
- HAYNES, MARTHA P. Void Statistics, Scaling, and the Origins of Large-Scale Structure. *J. N. Fry, Riccardo Giovanelli, Martha P. Haynes, Adrian L. Melott, and Robert J. Scherrer.* **340**, 11, 67-B4 (1989)
- The Topology of Large-Scale Structure. III. Analysis of Observations. *J. Richard Gott III, John Miller, Trinh X. Thuan, Stephen E. Schneider, David H. Weinberg, Charles Gammie, Kevin Polk, Michael Vogeley, Scott Jeffrey, Suketu P. Bhavsar, Adrian L. Melott, Riccardo Giovanelli, Martha P. Haynes, R. Brent Tully, and Andrew J. S. Hamilton.* **340**, 625, 76-C1 (1989)
- HENSON, G. D. Discovery of Broad-Band Optical Circular Polarization in Alpha Leonis. *G. D. Henson, J. C. Kemp, D. J. Kraus, and D. J. Hankins.* **340**, L65, 83-C5 (1989)

- HERBST, ERIC. Deuterium Fractionation in Dense Interstellar Clouds. *T. J. Millar, A. Bennett, and Eric Herbst*. **340**, 906, 79-F1 (1989)
- HERNUST, LARS. TREESPH: A Unification of SPH with the Hierarchical Tree Method (Abstract of Paper in 1989 June Suppl.). *Lars Hernquist and Neal Katz*. **340**, 1146, 82-E3 (1989)
- HERSHEY, J. L. Angular Diameter Measurements of 24 Giant and Supergiant Stars from the Mark III Optical Interferometer. *D. J. Hutter, K. J. Johnston, D. Mozurkewich, R. S. Simon, M. M. Colavita, X. P. Pan, M. Shao, B. E. Hines, D. H. Staelin, J. L. Hershey, J. A. Hughes, and G. H. Kaplan*. **340**, 1103, 82-A5 (1989)
- HESTER, J. JEFF. Optical Imagery and Spectrophotometry of CTB 80. *J. Jeff Hester and Shrinivas R. Kulkarni*. **340**, 362, 71-E4 (1989)
- HINES, B. E. Angular Diameter Measurements of 24 Giant and Supergiant Stars from the Mark III Optical Interferometer. *D. J. Hutter, K. J. Johnston, D. Mozurkewich, R. S. Simon, M. M. Colavita, X. P. Pan, M. Shao, B. E. Hines, D. H. Staelin, J. L. Hershey, J. A. Hughes, and G. H. Kaplan*. **340**, 1103, 82-A5 (1989)
- HODGES, M. W. Superluminal Motion in the Quasar 3C 279. *S. C. Unwin, M. H. Cohen, J. A. Biretta, M. W. Hodges, and J. A. Zensus*. **340**, 117, 68-E6 (1989)
- HOFFMAN, YEHUDA. Dynamics of Superclusters: Reconciling $\Omega_0 = 1.0$ with Observations? *Yehuda Hoffman*. **340**, 69, 67-G3 (1989)
- HOGAN, CRAIG J. Mock Gravity and Cosmic Structure. *Craig J. Hogan*. **340**, 1, 67-A8 (1989)
- HOLLOWELL, DAVID. Neutron Production and Neutron-Capture Nucleosynthesis in a Low-Mass, Low-Metallicity Asymptotic Giant Branch Star. *David Hollowell and Icko Iben, Jr.* **340**, 966, 80-D1 (1989)
- HRIVNAK, BRUCE J. Radial Velocity Studies and Absolute Parameters of Contact Binaries. II. OO Aquilae. *Bruce J. Hrivnak*. **340**, 458, 73-A9 (1989)
- HUCHRA, J. P. The Properties of Infrared Color-selected Quasars. *F. J. Low, R. M. Cutri, S. G. Kleinmann, and J. P. Huchra*. **340**, L1, 75-C6 (1989)
- HUGHES, D. H. Multifrequency Observations of Blazars. III. The Spectral Shape of the Radio to X-Ray Continuum. *L. M. J. Brown, E. J. Robson, W. K. Gear, D. H. Hughes, M. J. Griffin, B. J. Geldzahler, P. R. Schwartz, M. G. Smith, A. G. Smith, D. W. Shepherd, J. R. Webb, E. Valtaoja, H. Terasanta, and E. Salonen*. **340**, 129, 68-F8 (1989)
- HUGHES, J. A. Angular Diameter Measurements of 24 Giant and Supergiant Stars from the Mark III Optical Interferometer. *D. J. Hutter, K. J. Johnston, D. Mozurkewich, R. S. Simon, M. M. Colavita, X. P. Pan, M. Shao, B. E. Hines, D. H. Staelin, J. L. Hershey, J. A. Hughes, and G. H. Kaplan*. **340**, 1103, 82-A5 (1989)
- HUMMER, D. G. Photospheres of Hot Stars. III. Luminosity Effects at Spectral Type O9.5. *Stephen A. Voels, Bruce Bohannan, David C. Abbott, and D. G. Hummer*. **340**, 1073, 81-F1 (1989)
- HURLEY, K. Gamma-Ray Burst Counterparts: Radio. *Bradley E. Schaefer, Thomas L. Cline, J.-L. Atteia, C. Barat, U. D. Desai, I. V. Estulin, W. D. Evans, E. E. Fenimore, K. Hurley, R. W. Klebesadel, A. V. Kuznetsov, J. G. Laros, N. Niel, and B. J. Teegarden*. **340**, 455, 72-G9 (1989)
- HUT, PIET. Error Analysis of a Tree Code (Abstract of Paper in 1989 June Suppl.). *Joshua E. Barnes and Piet Hut*. **340**, 1145, 82-E2 (1989)
- HUTTER, D. J. Angular Diameter Measurements of 24 Giant and Supergiant Stars from the Mark III Optical Interferometer. *D. J. Hutter, K. J. Johnston, D. Mozurkewich, R. S. Simon, M. M. Colavita, X. P. Pan, M. Shao, B. E. Hines, D. H. Staelin, J. L. Hershey, J. A. Hughes, and G. H. Kaplan*. **340**, 1103, 82-A5 (1989)
- HYLAND, A. R. Global Aspects of the NGC 6334 Star Formation Complex: An Infrared Survey. *Steven M. Straw and A. R. Hyland*. **340**, 318, 71-A5 (1989)
- IBEN, ICKO, JR. Neutron Production and Neutron-Capture Nucleosynthesis in a Low-Mass, Low-Metallicity Asymptotic Giant Branch Star. *David Hollowell and Icko Iben, Jr.* **340**, 966, 80-D1 (1989)
- IMAMURA, J. N. see PENNYPACKER, C. R., et al.
- IMPEY, CHRIS. The Wasilewski Sample of Emission-Line Galaxies: Follow-up CCD Imaging and Spectroscopic and IRAS Observations (Abstract of Paper in 1989 June Suppl.). *Gregory D. Bothun, Jules P. Halpern, Carol J. Lonsdale, Chris Impey, and Mark Schmitz*. **340**, 1144, 82-E1 (1989)
- JAFFE, D. T. First Detection of SO_2 and CH_3OH Emission and One Unidentified Line near 800 GHz. *J. Stutzki, R. Genzel, U. U. Graf, A. I. Harris, and D. T. Jaffe*. **340**, L37, 75-F5 (1989)
- JEFFREY, SCOTT. The Topology of Large-Scale Structure. III. Analysis of Observations. *J. Richard Gott III, John Miller, Trinh X. Thuan, Stephen E. Schneider, David H. Weinberg, Charles Gammie, Kevin Polk, Michael Voegelé, Scott Jeffrey, Suketu P. Bhavsar, Adrian L. Melott, Riccardo Giovanelli, Martha P. Haynes, R. Brent Tully, and Andrew J. S. Hamilton*. **340**, 625, 76-C1 (1989)
- JOHNSTON, K. J. Envelope Structures and Optical/Radio Positions of Cool Stars. *P. F. Bowers, K. J. Johnston, and C. de Vegt*. **340**, 479, 73-C1 (1989)
- H₂CO Maps of High-Density Molecular Fragments 3' North of Orion-KL. *T. L. Wilson and K. J. Johnston*. **340**, 894, 79-E1 (1989)
- Angular Diameter Measurements of 24 Giant and Supergiant Stars from the Mark III Optical Interferometer. *D. J. Hutter, K. J. Johnston, D. Mozurkewich, R. S. Simon, M. M. Colavita, X. P. Pan, M. Shao, B. E. Hines, D. H. Staelin, J. L. Hershey, J. A. Hughes, and G. H. Kaplan*. **340**, 1103, 82-A5 (1989)
- JOSEPH, CHARLES L. Predicting Peculiar Interstellar Extinction from Gaseous Abundances. *Charles L. Joseph, Theodore P. Snow, Jr., and C. Gregory Seab*. **340**, 314, 71-A1 (1989)
- JURA, M. Interstellar Matter in Early-Type Galaxies. I. IRAS Flux Densities (Abstract of Paper in 1989 June Suppl.). *G. R. Knapp, P. Guhathakurta, D.-W. Kim, and M. Jura*. **340**, 1145, 82-E2 (1989)
- KAHN, STEVEN M. Bowen Fluorescence in Scorpius X-1. *Jonathan Schachter, Alexei V. Filippenko, and Steven M. Kahn*. **340**, 1049, 81-D1 (1989)
- KAPLAN, G. H. Angular Diameter Measurements of 24 Giant and Supergiant Stars from the Mark III Optical Interferometer. *D. J. Hutter, K. J. Johnston, D. Mozurkewich, R. S. Simon, M. M. Colavita, X. P. Pan, M. Shao, B. E. Hines, D. H. Staelin, J. L. Hershey, J. A. Hughes, and G. H. Kaplan*. **340**, 1103, 82-A5 (1989)
- KAROVSKA, M. Measurements of the Diameter of the Large Magellanic Cloud Supernova SN 1987A. *M. Karovska, L. Koehlin, P. Nissen, C. Papaliolios, and C. Standley*. **340**, 435, 72-E12 (1989)
- KATO, MARIKO. Stellar Wind during Helium Nova Outburst. *Mariko Kato, Hideyuki Saio, and Izumi Hachisu*. **340**, 509, 73-E5 (1989)
- KATZ, J. I. Flash-photoionized Nebulae. *J. I. Katz*. **340**, 344, 71-C11 (1989)
- KATZ, NEAL. TREESPH: A Unification of SPH with the Hierarchical Tree Method (Abstract of Paper in 1989 June Suppl.). *Lars Hernquist and Neal Katz*. **340**, 1146, 82-E3 (1989)
- KAZÈS, I. Molecular Gas in the Powerful Radio Galaxies Perseus A and 4C 12.50. *I. F. Mirabel, D. B. Sanders, and I. Kazès*. **340**, L9, 75-D1 (1989)
- KEENAN, F. P. Solar Si III Line Ratios from the High-Resolution Telescope and Spectrograph on Board Spacelab 2: The Effects of Non-Maxwellian Electron Distribution Function. *F. P. Keenan, J. W. Cook, P. L. Dufton, and A. E. Kingston*. **340**, 1135, 82-D1 (1989)
- KEMP, J. C. Discovery of Broad-Band Optical Circular Polarization in Alpha Leonis. *G. D. Henson, J. C. Kemp, D. J. Kraus, and D. J. Hankins*. **340**, L65, 83-C5 (1989)
- KIM, D.-W. Interstellar Matter in Early-Type Galaxies. I. IRAS Flux Densities (Abstract of Paper in 1989 June Suppl.). *G. R. Knapp, P. Guhathakurta, D.-W. Kim, and M. Jura*. **340**, 1145, 82-E2 (1989)
- KINGSTON, A. E. Solar Si III Line Ratios from the High-Resolution Telescope and Spectrograph on Board Spacelab 2: The Effects of Non-Maxwellian Electron Distribution Function. *F. P. Keenan, J. W. Cook, P. L. Dufton, and A. E. Kingston*. **340**, 1135, 82-D1 (1989)
- KLEBESADEL, R. W. Gamma-Ray Burst Counterparts: Radio. *Bradley E. Schaefer, Thomas L. Cline, J.-L. Atteia, C. Barat, U. D. Desai, I. V. Estulin, W. D. Evans, E. E. Fenimore, K. Hurley, R. W. Klebesadel, A. V. Kuznetsov, J. G. Laros, N. Niel, and B. J. Teegarden*. **340**, 455, 72-G9 (1989)
- KLEINMANN, S. G. The Properties of Infrared Color-selected Quasars. *F. J. Low, R. M. Cutri, S. G. Kleinmann, and J. P. Huchra*. **340**, L1, 75-C6 (1989)
- KNAPP, G. R. Interstellar Matter in Early-Type Galaxies. I. IRAS Flux Densities (Abstract of Paper in 1989 June Suppl.). *G. R. Knapp, P. Guhathakurta, D.-W. Kim, and M. Jura*. **340**, 1145, 82-E2 (1989)
- KOBAYASHI, HIDEYUKI. Velocity Field in the Fragmented Molecular Cloud Core of W3: Evidence for Large-Scale Turbulence. *Masahiko Hayashi, Hideyuki Kobayashi, and Tetsuo Hasegawa*. **340**, 298, 70-F10 (1989)
- KOECHLIN, L. Measurements of the Diameter of the Large Magellanic Cloud Supernova SN 1987A. *M. Karovska, L. Koehlin, P. Nissen, C. Papaliolios, and C. Standley*. **340**, 435, 72-E12 (1989)
- KÖNIGL, ARIEH. The Radiative Deceleration of Relativistic Jets in Active Galactic Nuclei. *Fulvio Melia and Arieh Königl*. **340**, 162, 69-B5 (1989)
- KRAUS, D. J. Discovery of Broad-Band Optical Circular Polarization in Alpha Leonis. *G. D. Henson, J. C. Kemp, D. J. Kraus, and D. J. Hankins*. **340**, L65, 83-C5 (1989)
- KRISHNA SWAMY, K. S. Infrared Emission from Comets. *K. S. Krishna Swamy, S. A. Sandford, L. J. Allamandola, F. C. Witteborn, and J. D. Bregman*. **340**, 537, 73-G11 (1989)
- KRISTIAN, J. A. see PENNYPACKER, C. R., et al.
- KRZEMINSKI, WOJCIECH. Discovery of Optical Emission from the Rem-

- nant of SN 1957D in M83. *Knox S. Long, William P. Blair, and Wojciech Krzeminski*. **340**, L25, 75-E4 (1989)
- KUIPER, T. B. H. Detection of the $2_0 \rightarrow 3_{-1}$ Transition of $^{13}\text{CH}_3\text{OH}$ at 14.8 GHz. *T. B. H. Kuiper, W. L. Peters III, F. F. Gardner, J. B. Whitcock, and J. E. Reynolds*. **340**, L41, 75-F9 (1989)
- KULKARNI, SHRINIVAS R. Optical Imagery and Spectrophotometry of CTB 80. *J. Jeff Hester and Shrinivas R. Kulkarni*. **340**, 362, 71-E4 (1989)
- KUNKEL, W. E. see PENNYPACKER, C. R., et al.
- KUTTER, G. SIEGFRIED. Modeling the Classical Nova Outburst. I. Exploring the Physics of a New Mechanism. *G. Siegfried Kutter and Warren M. Sparks*. **340**, 985, 80-E6 (1989)
- KUZNETSOV, A. V. Gamma-Ray Burster Counterparts: Radio. *Bradley E. Schaefer, Thomas L. Cline, J.-L. Atteia, C. Barat, U. D. Desai, I. V. Estulin, W. D. Evans, E. E. Fenimore, K. Hurley, R. W. Klebesadel, A. V. Kuznetsov, J. G. Laros, N. Niel, and B. J. Teegarden*. **340**, 455, 72-G9 (1989)
- LADA, CHARLES J. IRAS Observations of the ρ Ophiuchi Infrared Cluster: Spectral Energy Distributions and Luminosity Function. *Bruce A. Wilking, Charles J. Lada, and Erick T. Young*. **340**, 823, 78-F3 (1989)
- LANGHOFF, STEPHEN R. Theoretical Study of the Dipole Moment Function of the $X^2\Sigma^+$ State of CN. *Stephen R. Langhoff and Charles W. Bauschlicher, Jr.* **340**, 620, 75-A1 (1989)
- LANGMEIER, A. Detection of a Strong Excess Noise Component in the Low State of 4U 1705 - 44. *A. Langmeier, G. Hasinger, and J. Trümper*. **340**, L21, 75-E1 (1989)
- LAROS, J. G. Gamma-Ray Burster Counterparts: Radio. *Bradley E. Schaefer, Thomas L. Cline, J.-L. Atteia, C. Barat, U. D. Desai, I. V. Estulin, W. D. Evans, E. E. Fenimore, K. Hurley, R. W. Klebesadel, A. V. Kuznetsov, J. G. Laros, N. Niel, and B. J. Teegarden*. **340**, 455, 72-G9 (1989)
- LATTIMER, JAMES M. Analysis of the Neutrino Events from Supernova 1987A. *James M. Lattimer and A. Yahil*. **340**, 426, 72-E1 (1989)
- LIFFMAN, KURT. Stochastic Evolution of Refractory Interstellar Dust during the Chemical Evolution of a Two-Phase Interstellar Medium. *Kurt Liffman and Donald D. Clayton*. **340**, 853, 79-B1 (1989)
- LIGHTMAN, ALAN P. Hot Accretion Disks with Electron-Positron Pairs. *Timothy R. White and Alan P. Lightman*. **340**, 1024, 81-A9 (1989)
- LILLY, S. J. Faint Identifications of "1 Jansky" Radio Source Empty Fields: Radio Galaxies at High Redshift. *S. J. Lilly*. **340**, 77, 68-A1 (1989)
- LISSAUER, JACK J. Erosion of Circumstellar Particle Disks by Interstellar Dust. *Jack J. Lissauer and Caitlin A. Griffith*. **340**, 468, 73-B1 (1989)
- LONG, KNOX S. Discovery of Optical Emission from the Remnant of SN 1957D in M83. *Knox S. Long, William P. Blair, and Wojciech Krzeminski*. **340**, L25, 75-E4 (1989)
- LONSDALE, CAROL J. The Wasilewski Sample of Emission-Line Galaxies: Follow-up CCD Imaging and Spectroscopic and IRAS Observations (Abstract of Paper in 1989 June Suppl.). *Gregory D. Bothun, Jules P. Halpern, Carol J. Lonsdale, Chris Impey, and Mark Schmitz*. **340**, 1144, 82-E1 (1989)
- LOW, B. C. Spontaneous Formation of Electric Current Sheets by the Expulsion of Magnetic Flux. *B. C. Low*. **340**, 558, 74-B8 (1989)
- LOW, F. J. The Properties of Infrared Color-selected Quasars. *F. J. Low, R. M. Cutri, S. G. Kleinmann, and J. P. Huchra*. **340**, L1, 75-C6 (1989)
- LUBOW, STEPHEN H. On the Dynamics of Mass Transfer over an Accretion Disk. *Stephen H. Lubow*. **340**, 1064, 81-E2 (1989)
- LYNE, ANDREW G. Three Fields Containing Young Pulsars: The Observable Lifetime of Supernova Remnants. *Robert Braun, W. Miller Goss, and Andrew G. Lyne*. **340**, 355, 71-D11 (1989)
- MACCACCARO, TOMMASO. The Relation between X-Ray Emission and Rotation in Late-Type Stars from the Perspective of X-Ray Selection. *Thomas A. Fleming, Isabella M. Gioia, and Tommaso Maccacaro*. **340**, 1011, 80-G8 (1989)
- MADORE, BARRY F. Photographic, Near-Infrared, and CCD Photometry of the Distant Globular Cluster AM-1. *Barry F. Madore and Wendy L. Freedman*. **340**, 812, 78-E1 (1989)
- MARASCHI, LAURA. Bulk Acceleration in Relativistic Jets and the Spectral Properties of Blazars. *Gabriele Ghisellini and Laura Maraschi*. **340**, 181, 69-C13 (1989)
- MASI, SIVIA. Extragalactic Infrared Backgrounds, Polarization, and Universal Magnetic Field. *Paolo de Bernardis, Sivia Masi, Francesco Melchiorri, and Giovanni Moreno*. **340**, L45, 83-A10 (1989)
- MATSUHARA, HIDEO. An Infrared Study of Starbursts in the Interacting Galaxy Pair Arp 299 (NGC 3690 + IC 694). *Takao Nakagawa, Tetsuya Nagata, T. R. Geballe, Haruyuki Okuda, Hiroshi Shibai, and Hideo Matsuura*. **340**, 729, 77-E1 (1989)
- MAZZITELLI, I. The Core Mass at the Helium Flash: Influence of Physical and Numerical Inputs. *I. Mazzitelli*. **340**, 249, 70-B6 (1989)
- MELCHIORRI, FRANCESCO. Extragalactic Infrared Backgrounds, Polarization, and Universal Magnetic Field. *Paolo de Bernardis, Sivia Masi, Francesco Melchiorri, and Giovanni Moreno*. **340**, L45, 83-A10 (1989)
- MELIA, FULVIO. The Radiative Deceleration of Relativistic Jets in Active Galactic Nuclei. *Fulvio Melia and Arieh Königl*. **340**, 162, 69-B5 (1989)
- MELLOTT, ADRIAN L. Void Statistics, Scaling, and the Origins of Large-Scale Structure. *J. N. Fry, Riccardo Giovanelli, Martha P. Haynes, Adrian L. Melott, and Robert J. Scherrer*. **340**, 11, 67-B4 (1989)
- The Topology of Large-Scale Structure. III. Analysis of Observations. *J. Richard Gott III, John Miller, Trinh X. Thuan, Stephen E. Schneider, David H. Weinberg, Charles Gammie, Kevin Polk, Michael Vogeley, Scott Jeffrey, Suketu P. Bhavsar, Adrian L. Melott, Riccardo Giovanelli, Martha P. Haynes, R. Brent Tully, and Andrew J. S. Hamilton*. **340**, 625, 76-C1 (1989)
- The Area of Isodensity Contours in Cosmological Models and Galaxy Surveys. *Barbara S. Ryden, Adrian L. Melott, David A. Craig, J. Richard Gott III, David H. Weinberg, Robert J. Scherrer, Suketu P. Bhavsar, and John M. Miller*. **340**, 647, 76-E1 (1989)
- MÉSZÁROS, P. High-Energy Gamma-Ray Absorption in Relativistic Magnetospheres. *H. Riffert, P. Mészáros, and Z. Bagoly*. **340**, 443, 72-F8 (1989)
- MIDDLEDITCH, J. see PENNYPACKER, C. R., et al.
- MILLAR, T. J. Deuterium Fractionation in Dense Interstellar Clouds. *T. J. Millar, A. Bennett, and Eric Herbst*. **340**, 906, 79-F1 (1989)
- MILLER, JOHN. The Topology of Large-Scale Structure. III. Analysis of Observations. *J. Richard Gott III, John Miller, Trinh X. Thuan, Stephen E. Schneider, David H. Weinberg, Charles Gammie, Kevin Polk, Michael Vogeley, Scott Jeffrey, Suketu P. Bhavsar, Adrian L. Melott, Riccardo Giovanelli, Martha P. Haynes, R. Brent Tully, and Andrew J. S. Hamilton*. **340**, 625, 76-C1 (1989)
- MILLER, JOHN M. The Area of Isodensity Contours in Cosmological Models and Galaxy Surveys. *Barbara S. Ryden, Adrian L. Melott, David A. Craig, J. Richard Gott III, David H. Weinberg, Robert J. Scherrer, Suketu P. Bhavsar, and John M. Miller*. **340**, 647, 76-E1 (1989)
- MIRABEL, I. F. Molecular Gas in the Powerful Radio Galaxies Perseus A and 4C 12.50. *I. F. Mirabel, D. B. Sanders, and I. Kézës*. **340**, L9, 75-D1 (1989)
- Atomic Hydrogen in the Powerful Radio-Infrared Galaxies 4C 12.50 and 3C 433. *I. F. Mirabel*. **340**, L13, 75-D6 (1989)
- The Ratio of Molecular to Atomic Gas in Infrared Luminous Galaxies. *I. F. Mirabel and D. B. Sanders*. **340**, L53, 83-B5 (1989)
- MOLARO, PAOLO. Million Degree Gas in the Galactic Halo and the Large Magellanic Cloud. II. The Line of Sight to SN 1987A. *Max Pettini, Raylee Stathakis, Sandro D'Odorico, Paolo Molaro, and Giovanni Vladilo*. **340**, 256, 70-C1 (1989)
- MORENO, GIOVANNI. Extragalactic Infrared Backgrounds, Polarization, and Universal Magnetic Field. *Paolo de Bernardis, Sivia Masi, Francesco Melchiorri, and Giovanni Moreno*. **340**, L45, 83-A10 (1989)
- MORRIS, D. E. see PENNYPACKER, C. R., et al.
- MORRIS, SIMON L. Optically Thin Gas in the Broad-Line Region of Seyfert Galaxies. *Simon L. Morris and Martin J. Ward*. **340**, 713, 77-C6 (1989)
- MOZURKEWICH, D. Angular Diameter Measurements of 24 Giant and Supergiant Stars from the Mark III Optical Interferometer. *D. J. Hutter, K. J. Johnston, D. Mozurkewich, R. S. Simon, M. M. Colavita, X. P. Pan, M. Shao, B. E. Hines, D. H. Staelin, J. L. Hershey, J. A. Hughes, and G. H. Kaplan*. **340**, 1103, 82-A5 (1989)
- MULLER, R. A. see PENNYPACKER, C. R., et al.
- MYERS, P. C. High-Resolution CO Observations of Young Low-Mass Stars. *S. Terebey, S. N. Vogel, and P. C. Myers*. **340**, 472, 73-B5 (1989)
- MYRA, ERIC S. Neutrino Transport and the Prompt Mechanism for Type II Supernovae. *Eric S. Myra and Sidney A. Bhudman*. **340**, 384, 72-A9 (1989)
- NAGATA, TETSUYA. An Infrared Study of Starbursts in the Interacting Galaxy Pair Arp 299 (NGC 3690 + IC 694). *Takao Nakagawa, Tetsuya Nagata, T. R. Geballe, Haruyuki Okuda, Hiroshi Shibai, and Hideo Matsuura*. **340**, 729, 77-E1 (1989)
- NAKAGAWA, TAKAO. An Infrared Study of Starbursts in the Interacting Galaxy Pair Arp 299 (NGC 3690 + IC 694). *Takao Nakagawa, Tetsuya Nagata, T. R. Geballe, Haruyuki Okuda, Hiroshi Shibai, and Hideo Matsuura*. **340**, 729, 77-E1 (1989)
- NEUFELD, DAVID A. Fast Molecular Shocks. I. Re-formation of Molecules behind a Dissociative Shock. *David A. Neufeld and A. Daigarno*. **340**, 869, 79-C3 (1989)
- NIEL, N. Gamma-Ray Burster Counterparts: Radio. *Bradley E. Schaefer,*

- Thomas L. Cline, J.-L. Atteia, C. Barat, U. D. Desai, I. V. Estulin, W. D. Evans, E. E. Fenimore, K. Hurley, R. W. Klebesadel, A. V. Kuznetsov, J. G. Laros, N. Niel, and B. J. Teegarden. **340**, 455, 72-G9 (1989)
- NIENSON, P. Measurements of the Diameter of the Large Magellanic Cloud Supernova SN 1987A. M. Karouska, L. Koechlin, P. Nisenson, C. Papaliolios, and C. Standley. **340**, 435, 72-E12 (1989)
- NOLL, K. S. Unusual Features of the 1-4 Micron Spectrum of HR 4049. T. R. Geballe, K. S. Noll, D. C. B. Whittet, and L. B. F. M. Waters. **340**, L29, 75-E9 (1989)
- NORRIS, JOHN E. Population Studies. VII. On the Use of *UBV* Data for Kinematically Selected Samples to Determine the Dependence of Kinematics on Abundance. John E. Norris and Sean G. Ryan. **340**, 739, 77-F1 (1989)
- NORRIS, R. P. VLBI Observations of the OH Megamaser in IC 4553 (Arp 220). P. J. Diamond, R. P. Norris, W. A. Baan, and R. S. Booth. **340**, L49, 83-B1 (1989)
- OEMLER, AUGUSTUS, JR. The Clustering of Dwarf Galaxies. Jo Ann Eder, James M. Schombert, Avishai Dekel, and Augustus Oemler, Jr. **340**, 29, 67-C10 (1989)
- OKUDA, HARUYUKI. An Infrared Study of Starbursts in the Interacting Galaxy Pair Arp 299 (NGC 3690 + IC 694). Takao Nakagawa, Tetsuya Nagata, T. R. Geballe, Haruyuki Okuda, Hiroshi Shibai, and Hideo Matsuhara. **340**, 729, 77-E1 (1989)
- OWEN, FRAZER N. High-Resolution, High Dynamic Range VLA Images of the M87 Jet at 2 Centimeters. Frazer N. Owen, Philip E. Hardee, and T. J. Cornwell. **340**, 698, 77-B1 (1989)
- PADOVANI, P. The Connection between Active and Normal Galaxies. A. Cavaliere and P. Padovani. **340**, L5, 75-C11 (1989)
- PAN, X. P. Angular Diameter Measurements of 24 Giant and Supergiant Stars from the Mark III Optical Interferometer. D. J. Hutter, K. J. Johnston, D. Mozurkewich, R. S. Simon, M. M. Colavita, X. P. Pan, M. Shao, B. E. Hines, D. H. Staelin, J. L. Hershey, J. A. Hughes, and G. H. Kaplan. **340**, 1103, 82-A5 (1989)
- PAPALIOLIOS, C. Measurements of the Diameter of the Large Magellanic Cloud Supernova SN 1987A. M. Karouska, L. Koechlin, P. Nisenson, C. Papaliolios, and C. Standley. **340**, 435, 72-E12 (1989)
- PENNYPACKER, C. R., et al. Limits on an Optical Pulsar in Supernova 1987A. C. R. Pennyacker, J. A. Kristian, J. Middleditch, M. A. Hamuy, J. N. Imamura, W. E. Kunkel, D. E. Morris, R. A. Muller, S. Perlmutter, S. J. Rawlings, T. P. Sasseen, I. K. Shelton, T. Y. Steiman-Cameron, and I. R. Tuohy. **340**, L61, 83-C1 (1989)
- PERLMUTTER, S. see PENNYPACKER, C. R., et al.
- PETERS, W. L., III. Detection of the $2_0 \rightarrow 3_{-1}$ Transition of $^{13}\text{CH}_3\text{OH}$ at 14.8 GHz. T. B. H. Kuiper, W. L. Peters III, F. F. Gardner, J. B. Whiteoak, and J. E. Reynolds. **340**, L41, 75-F9 (1989)
- PETTINI, MAX. Million Degree Gas in the Galactic Halo and the Large Magellanic Cloud. II. The Line of Sight to SN 1987A. Max Pettini, Raylee Stathakis, Sandro D'Odorico, Paolo Molaro, and Giovanni Vladilo. **340**, 256, 70-C7 (1989)
- POLK, KEVIN. The Topology of Large-Scale Structure. III. Analysis of Observations. J. Richard Gott III, John Miller, Trinh X. Thuan, Stephen E. Schneider, David H. Weinberg, Charles Gammie, Kevin Polk, Michael Vogeley, Scott Jeffrey, Suketup P. Bhavsar, Adrian L. Melott, Riccardo Giovanelli, Martha P. Haynes, R. Brent Tully, and Andrew J. S. Hamilton. **340**, 625, 76-C1 (1989)
- POPP, BRUCE. Observations of the 12 Micron Mg I Lines in Various Solar Features. Harold Zirin and Bruce Popp. **340**, 571, 74-C9 (1989)
- PRIEST, E. R. The Nonuniform Magnetohydrodynamic Nature of the Solar Corona. II. Generalization of Basic Solutions. A. de Ville and E. R. Priest. **340**, 579, 74-D5 (1989)
- PTUSKIN, V. S. Diffusive Shock Acceleration of Cosmic Rays and Gamma Radiation from Young Supernova Shells. V. S. Berezinsky and V. S. Ptuskin. **340**, 351, 71-D6 (1989)
- PULONE, L. The "Red Giant Clock" as an Indicator for the Efficiency of Central Mixing in Horizontal-Branch Stars. F. Caputo, V. Castellani, A. Chieffi, L. Pulone, and A. Tornambè. **340**, 241, 70-A10 (1989)
- QIAO, GUO-JUN. An Analysis on the Precession of the Accretion Disk on Hercules X-1. Guo-jun Qiao and Jiu-heng Cheng. **340**, 503, 73-D11 (1989)
- RAWLINGS, S. J. see PENNYPACKER, C. R., et al.
- REGEV, ODED. How Much Boundary Layer Heating Occurs in an Accreting Prenewa White Dwarf? Oded Regev and Michael M. Shara. **340**, 1006, 80-G1 (1989)
- REYNOLDS, J. E. Detection of the $2_0 \rightarrow 3_{-1}$ Transition of $^{13}\text{CH}_3\text{OH}$ at 14.8 GHz. T. B. H. Kuiper, W. L. Peters III, F. F. Gardner, J. B. Whiteoak, and J. E. Reynolds. **340**, L41, 75-F9 (1989)
- RIFFERT, H. High-Energy Gamma-Ray Absorption in Relativistic Magnetospheres. H. Riffert, P. Mészáros, and Z. Bogoly. **340**, 443, 72-F8 (1989)
- ROBSON, E. I. Multifrequency Observations of Blazars. III. The Spectral Shape of the Radio to X-Ray Continuum. L. M. J. Brown, E. I. Robson, W. K. Gear, D. H. Hughes, M. J. Griffin, B. J. Geldzahler, P. R. Schwartz, M. G. Smith, A. G. Smith, D. W. Shepherd, J. R. Webb, E. Valtaoja, H. Terasranta, and E. Salonen. **340**, 129, 68-F8 (1989)
- Multifrequency Observations of Blazars. IV. The Variability of the Radio to Ultraviolet Continuum. L. M. J. Brown, E. I. Robson, W. K. Gear, and M. G. Smith. **340**, 150, 69-A2 (1989)
- RYAN, SEAN G. Population Studies. VII. On the Use of *UBV* Data for Kinematically Selected Samples to Determine the Dependence of Kinematics on Abundance. John E. Norris and Sean G. Ryan. **340**, 739, 77-F1 (1989)
- RYDEN, BARBARA S. The Area of Isodensity Contours in Cosmological Models and Galaxy Surveys. Barbara S. Ryden, Adrian L. Melott, David A. Craig, J. Richard Gott III, David H. Weinberg, Robert J. Scherrer, Suketup P. Bhavsar, and John M. Miller. **340**, 647, 76-E1 (1989)
- SAHADE, JORGE. An Interpretation of the Line Profile Variations in the IUE Spectrum of the Wolf-Rayet Binary γ_2 Velorum. Estela Brandi, Osvaldo E. Ferrer, and Jorge Sahade. **340**, 1091, 81-G6 (1989)
- SAIO, HIDEYUKI. Stellar Wind during Helium Nova Outburst. Mariko Kato, Hideyuki Saio, and Izumi Hachisu. **340**, 509, 73-E5 (1989)
- SALONEN, E. Multifrequency Observations of Blazars. III. The Spectral Shape of the Radio to X-Ray Continuum. L. M. J. Brown, E. I. Robson, W. K. Gear, D. H. Hughes, M. J. Griffin, B. J. Geldzahler, P. R. Schwartz, M. G. Smith, A. G. Smith, D. W. Shepherd, J. R. Webb, E. Valtaoja, H. Terasranta, and E. Salonen. **340**, 129, 68-F8 (1989)
- SANDELL, G. Submillimeter Measurements of T Tauri and FU Orionis Stars. David A. Weintraub, G. Sandell, and W. D. Duncan. **340**, L69, 83-C10 (1989)
- SANDERS, D. B. Molecular Gas in the Powerful Radio Galaxies Perseus A and 4C 12.50. I. F. Mirabel, D. B. Sanders, and I. Kazès. **340**, L9, 75-D1 (1989)
- The Ratio of Molecular to Atomic Gas in Infrared Luminous Galaxies. I. F. Mirabel and D. B. Sanders. **340**, L53, 83-B5 (1989)
- SANDFORD, S. A. Infrared Emission from Comets. K. S. Krishna Swamy, S. A. Sandford, L. J. Allamandola, F. C. Witteborn, and J. D. Bregman. **340**, 537, 73-G11 (1989)
- SASSEEN, T. P. see PENNYPACKER, C. R., et al.
- SAVAGE, BLAIR D. The Density Distribution of Refractory Elements Away from the Galactic Plane. Richard J. Edgar and Blair D. Savage. **340**, 762, 78-A1 (1989)
- SCHACHTER, JONATHAN. Bowen Fluorescence in Scorpius X-1. Jonathan Schachter, Alexei V. Filippenko, and Steven M. Kahn. **340**, 1049, 81-D1 (1989)
- SCHAEFER, BRADLEY E. Gamma-Ray Burster Counterparts: Radio. Bradley E. Schaefer, Thomas L. Cline, J.-L. Atteia, C. Barat, U. D. Desai, I. V. Estulin, W. D. Evans, E. E. Fenimore, K. Hurley, R. W. Klebesadel, A. V. Kuznetsov, J. G. Laros, N. Niel, and B. J. Teegarden. **340**, 455, 72-G9 (1989)
- SCHERRER, ROBERT J. Void Statistics, Scaling, and the Origins of Large-Scale Structure. J. N. Fry, Riccardo Giovanelli, Martha P. Haynes, Adrian L. Melott, and Robert J. Scherrer. **340**, 11, 67-B4 (1989)
- The Area of Isodensity Contours in Cosmological Models and Galaxy Surveys. Barbara S. Ryden, Adrian L. Melott, David A. Craig, J. Richard Gott III, David H. Weinberg, Robert J. Scherrer, Suketup P. Bhavsar, and John M. Miller. **340**, 647, 76-E1 (1989)
- SCHMITT, B. The Temperature Dependence of the CO Infrared Band Strength in CO: H₂O Ices. B. Schmitt, J. Mayo Greenberg, and R. J. A. Grim. **340**, L33, 75-F1 (1989)
- SCHMITZ, MARK. The Wasilewski Sample of Emission-Line Galaxies: Follow-up CCD Imaging and Spectroscopic and IRAS Observations (Abstract of Paper in 1989 June Suppl.). Gregory D. Bothun, Jules P. Halpern, Carol J. Lonsdale, Chris Impey, and Mark Schmitz. **340**, 1144, 82-E1 (1989)
- SCHNEIDER, STEPHEN E. The Topology of Large-Scale Structure. III. Analysis of Observations. J. Richard Gott III, John Miller, Trinh X. Thuan, Stephen E. Schneider, David H. Weinberg, Charles Gammie, Kevin Polk, Michael Vogeley, Scott Jeffrey, Suketup P. Bhavsar, Adrian L. Melott, Riccardo Giovanelli, Martha P. Haynes, R. Brent Tully, and Andrew J. S. Hamilton. **340**, 625, 76-C1 (1989)
- SCHOMBERT, JAMES M. The Clustering of Dwarf Galaxies. Jo Ann Eder, James M. Schombert, Avishai Dekel, and Augustus Oemler, Jr. **340**, 29, 67-C10 (1989)
- SCHWARTZ, P. R. Multifrequency Observations of Blazars. III. The Spectral Shape of the Radio to X-Ray Continuum. L. M. J. Brown, E. I. Robson, W. K. Gear, D. H. Hughes, M. J. Griffin, B. J. Geldzahler, P.

- hashi, and Noriaki Shibasaki. 340, 950, 80-B9 (1989)
- TAYLOR, A. R. VLA Observations of Circumnebular Neutral Hydrogen in IC 418. A. R. Taylor, G. T. Gussie, and W. M. Goss. 340, 932, 80-A6 (1989)
- TEEGARDEN, B. J. Gamma-Ray Burst Counterparts: Radio. Bradley E. Schaefer, Thomas L. Cline, J.-L. Atteia, C. Barat, U. D. Desai, I. V. Estulin, W. D. Evans, E. E. Fenimore, K. Hurley, R. W. Klebesadel, A. V. Kuznetsov, J. G. Laros, N. Niel, and B. J. Teegarden. 340, 455, 72-G9 (1989)
- TERASRANTA, H. Multifrequency Observations of Blazars. III. The Spectral Shape of the Radio to X-Ray Continuum. L. M. J. Brown, E. I. Robson, W. K. Gear, D. H. Hughes, M. J. Griffin, B. J. Geldzahler, P. R. Schwartz, M. G. Smith, A. G. Smith, D. W. Shepherd, J. R. Webb, E. Valtaoja, H. Terasranta, and E. Salonen. 340, 129, 68-F8 (1989)
- TEREBEY, S. High-Resolution CO Observations of Young Low-Mass Stars. S. Terebey, S. N. Vogel, and P. C. Myers. 340, 472, 73-B5 (1989)
- TERMAN, JAMES L. Hydrogen as a Test of Type Ia Supernova Progenitor Models. James H. Applegate and James L. Terman. 340, 380, 72-A5 (1989)
- THUAN, TRINH X. The Topology of Large-Scale Structure. III. Analysis of Observations. J. Richard Gott III, John Miller, Trinh X. Thuan, Stephen E. Schneider, David H. Weinberg, Charles Gammie, Kevin Polk, Michael Vogeley, Scott Jeffrey, Suketu P. Bhavsar, Adrian L. Melott, Riccardo Giovanelli, Martha P. Haynes, R. Brent Tully, and Andrew J. S. Hamilton. 340, 625, 76-C1 (1989)
- TORBETT, MICHAEL V. Radio Emission from Symbiotic Variables: CI Cygni, Z Andromedae, and EG Andromedae—Temporal Variability as Clues to the Nature of Symbiotics. Michael V. Torbett and Bel Campbell. 340, L73, 83-D1 (1989)
- TORNAMBÉ, A. The "Red Giant Clock" as an Indicator for the Efficiency of Central Mixing in Horizontal-Branch Stars. F. Caputo, V. Castellani, A. Chieffi, L. Pulone, and A. Tornambé. 340, 241, 70-A10 (1989)
- TRITZ, BRADLEY G. Effects of Electron-Positron Pairs on Accretion Flows. Bradley G. Tritz and Sachiko Tsuruta. 340, 203, 69-E9 (1989)
- TRÜMPER, J. Detection of a Strong Excess Noise Component in the Low State of 4U 1705—44. A. Langmeier, G. Hasinger, and J. Trümper. 340, L21, 75-E1 (1989)
- TSURUTA, SACHIKO. Effects of Electron-Positron Pairs on Accretion Flows. Bradley G. Tritz and Sachiko Tsuruta. 340, 203, 69-E9 (1989)
- TULLY, R. BRENT. The Topology of Large-Scale Structure. III. Analysis of Observations. J. Richard Gott III, John Miller, Trinh X. Thuan, Stephen E. Schneider, David H. Weinberg, Charles Gammie, Kevin Polk, Michael Vogeley, Scott Jeffrey, Suketu P. Bhavsar, Adrian L. Melott, Riccardo Giovanelli, Martha P. Haynes, R. Brent Tully, and Andrew J. S. Hamilton. 340, 625, 76-C1 (1989)
- TUOHY, I. R. see PENNYPACKER, C. R., et al.
- TURNER, B. E. The Absence of Interstellar HCCO and the Bates Dissociative Recombination Theory. B. E. Turner and Trevor J. Sears. 340, 900, 79-E7 (1989)
- UNWIN, S. C. Superluminal Motion in the Quasar 3C 279. S. C. Unwin, M. H. Cohen, J. A. Biretta, M. W. Hodges, and J. A. Zensus. 340, 117, 68-E6 (1989)
- VALTAOJA, E. Multifrequency Observations of Blazars. III. The Spectral Shape of the Radio to X-Ray Continuum. L. M. J. Brown, E. I. Robson, W. K. Gear, D. H. Hughes, M. J. Griffin, B. J. Geldzahler, P. R. Schwartz, M. G. Smith, A. G. Smith, D. W. Shepherd, J. R. Webb, E. Valtaoja, H. Terasranta, and E. Salonen. 340, 129, 68-F8 (1989)
- VAN DISHOECK, EWINE F. Interstellar C₂, CH, and CN in Translucent Molecular Clouds. Ewine F. van Dishoeck and John H. Black. 340, 273, 70-D10 (1989)
- VAN STEENBERG, MICHAEL E. Galactic Interstellar Abundance Surveys with IUE. III. Silicon, Manganese, Iron, Sulfur, and Zinc: Erratum. Michael E. Van Steenberg and J. Michael Shull. 340, 624, 75-A9 (1989) (Orig. paper in 330, 942, 102-G7)
- VELTRI, PIERLUIGI. Extragalactic Jets as Current Carrying Systems. II. Magnetohydrodynamic Turbulence, Relativistic Electron Distribution, and Observable Quantities. Edvige Corbelli and Pierluigi Veltri. 340, 679, 76-G7 (1989)
- VIEGAS-ALDROVANDI, SUELI M. Mystery Spot in Supernova 1987A: Reflection or Fluorescence by an Interstellar Cloud? James E. Felten, Eli Dwek, and Sueli M. Viegas-Aldrovandi. 340, 943, 80-B2 (1989)
- VLADILLO, GIOVANNI. Million Degree Gas in the Galactic Halo and the Large Magellanic Cloud. II. The Line of Sight to SN 1987A. Max Pettini, Raylee Stathakis, Sandro D'Odorico, Paolo Molaro, and Giovanni Vladilo. 340, 256, 70-C1 (1989)
- VOELS, STEPHEN A. Photospheres of Hot Stars. III. Luminosity Effects at Spectral Type O9.5. Stephen A. Voels, Bruce Bohannan, David C. Abbott, and D. G. Hummer. 340, 1073, 81-F1 (1989)
- VOGEL, S. N. High-Resolution CO Observations of Young Low-Mass R. Schwartz, M. G. Smith, A. G. Smith, D. W. Shepherd, J. R. Webb, E. Valtaoja, H. Terasranta, and E. Salonen. 340, 129, 68-F8 (1989)
- SEAB, C. GREGORY. Predicting Peculiar Interstellar Extinction from Gaseous Abundances. Charles L. Joseph, Theodore P. Snow, Jr., and C. Gregory Seab. 340, 314, 71-A1 (1989)
- SEARS, TREVOR J. The Absence of Interstellar HCCO and the Bates Dissociative Recombination Theory. B. E. Turner and Trevor J. Sears. 340, 900, 79-E7 (1989)
- SHAO, M. Angular Diameter Measurements of 24 Giant and Supergiant Stars from the Mark III Optical Interferometer. D. J. Hutter, K. J. Johnston, D. Mozurkewich, R. S. Simon, M. M. Colavita, X. P. Pan, M. Shao, B. E. Hines, D. H. Staelin, J. L. Hershey, J. A. Hughes, and G. H. Kaplan. 340, 1103, 82-A5 (1989)
- SHARA, MICHAEL M. How Much Boundary Layer Heating Occurs in an Accreting Pre-nova White Dwarf? Oded Regev and Michael M. Shara. 340, 1006, 80-G1 (1989)
- SHELTON, I. K. see PENNYPACKER, C. R., et al.
- SHEPHERD, D. W. Multifrequency Observations of Blazars. III. The Spectral Shape of the Radio to X-Ray Continuum. L. M. J. Brown, E. I. Robson, W. K. Gear, D. H. Hughes, M. J. Griffin, B. J. Geldzahler, P. R. Schwartz, M. G. Smith, A. G. Smith, D. W. Shepherd, J. R. Webb, E. Valtaoja, H. Terasranta, and E. Salonen. 340, 129, 68-F8 (1989)
- SHIBAI, HIROSHI. An Infrared Study of Starbursts in the Interacting Galaxy Pair Arp 299 (NGC 3690 + IC 694). Takao Nakagawa, Tetsuya Nagata, T. R. Geballe, Haruyuki Okuda, Hiroshi Shibai, and Hideo Matsuhara. 340, 729, 77-E1 (1989)
- SHIBAZAKI, NORIAKI. Gamma-Ray Lines Produced by Low-Energy Cosmic Rays in SN 1987A. Toshikazu Ebisuzaki, Yoshiyuki Takahashi, and Noriaki Shibasaki. 340, 950, 80-B9 (1989)
- SHULL, J. MICHAEL. Galactic Interstellar Abundance Surveys with IUE. III. Silicon, Manganese, Iron, Sulfur, and Zinc: Erratum. Michael E. Van Steenberg and J. Michael Shull. 340, 624, 75-A9 (1989) (Orig. paper in 330, 942, 102-G7)
- SIMON, R. S. Angular Diameter Measurements of 24 Giant and Supergiant Stars from the Mark III Optical Interferometer. D. J. Hutter, K. J. Johnston, D. Mozurkewich, R. S. Simon, M. M. Colavita, X. P. Pan, M. Shao, B. E. Hines, D. H. Staelin, J. L. Hershey, J. A. Hughes, and G. H. Kaplan. 340, 1103, 82-A5 (1989)
- SMITH, A. G. Multifrequency Observations of Blazars. III. The Spectral Shape of the Radio to X-Ray Continuum. L. M. J. Brown, E. I. Robson, W. K. Gear, D. H. Hughes, M. J. Griffin, B. J. Geldzahler, P. R. Schwartz, M. G. Smith, A. G. Smith, D. W. Shepherd, J. R. Webb, E. Valtaoja, H. Terasranta, and E. Salonen. 340, 129, 68-F8 (1989)
- SMITH, M. G. Multifrequency Observations of Blazars. III. The Spectral Shape of the Radio to X-Ray Continuum. L. M. J. Brown, E. I. Robson, W. K. Gear, D. H. Hughes, M. J. Griffin, B. J. Geldzahler, P. R. Schwartz, M. G. Smith, A. G. Smith, D. W. Shepherd, J. R. Webb, E. Valtaoja, H. Terasranta, and E. Salonen. 340, 129, 68-F8 (1989)
- Multifrequency Observations of Blazars. IV. The Variability of the Radio to Ultraviolet Continuum. L. M. J. Brown, E. I. Robson, W. K. Gear, and M. G. Smith. 340, 150, 69-A2 (1989)
- SNOW, THEODORE P., JR. Predicting Peculiar Interstellar Extinction from Gaseous Abundances. Charles L. Joseph, Theodore P. Snow, Jr., and C. Gregory Seab. 340, 314, 71-A1 (1989)
- SOKER, NOAM. Early Shaping of Asymmetrical Planetary Nebulae. Noam Soker. 340, 927, 80-A1 (1989)
- SPARKS, WARREN M. Modeling the Classical Nova Outburst. I. Exploring the Physics of a New Mechanism. G. Siegfried Kutter and Warren M. Sparks. 340, 985, 80-E6 (1989)
- STAEELIN, D. H. Angular Diameter Measurements of 24 Giant and Supergiant Stars from the Mark III Optical Interferometer. D. J. Hutter, K. J. Johnston, D. Mozurkewich, R. S. Simon, M. M. Colavita, X. P. Pan, M. Shao, B. E. Hines, D. H. Staelin, J. L. Hershey, J. A. Hughes, and G. H. Kaplan. 340, 1103, 82-A5 (1989)
- STANDLEY, C. Measurements of the Diameter of the Large Magellanic Cloud Supernova SN 1987A. M. Karovska, L. Koehnlin, P. Nissen, C. Papaliolios, and C. Standley. 340, 435, 72-E12 (1989)
- STATHAKIS, RAYLEE. Million Degree Gas in the Galactic Halo and the Large Magellanic Cloud. II. The Line of Sight to SN 1987A. Max Pettini, Raylee Stathakis, Sandro D'Odorico, Paolo Molaro, and Giovanni Vladilo. 340, 256, 70-C1 (1989)
- STEIMAN-CAMERON, T. Y. see PENNYPACKER, C. R., et al.
- STRAW, STEVEN M. Global Aspects of the NGC 6334 Star Formation Complex: An Infrared Survey. Steven M. Straw and A. R. Hyland. 340, 318, 71-A5 (1989)
- STUTZKI, J. First Detection of SO₂ and CH₃OH Emission and One Unidentified Line near 800 GHz. J. Stutzki, R. Genzel, U. U. Graf, A. I. Harris, and D. T. Jaffe. 340, L37, 75-F5 (1989)
- TAKAHASHI, YOSHIYUKI. Gamma-Ray Lines Produced by Low-Energy Cosmic Rays in SN 1987A. Toshikazu Ebisuzaki, Yoshiyuki Takahashi, and Noriaki Shibasaki. 340, 950, 80-B9 (1989)

- Stars. *S. Terebey, S. N. Vogel, and P. C. Myers.* **340**, 472, 73-B5 (1989)
- VOGELEY, MICHAEL. The Topology of Large-Scale Structure. III. Analysis of Observations. *J. Richard Gott III, John Miller, Trinh X. Thuan, Stephen E. Schneider, David H. Weinberg, Charles Gammie, Kevin Polk, Michael Vogeley, Scott Jeffrey, Suketu P. Bhavsar, Adrian L. Melott, Riccardo Giovanelli, Martha P. Haynes, R. Brent Tully, and Andrew J. S. Hamilton.* **340**, 625, 76-C1 (1989)
- WARD, MARTIN J. Optically Thin Gas in the Broad-Line Region of Seyfert Galaxies. *Simon L. Morris and Martin J. Ward.* **340**, 713, 77-C6 (1989)
- WATERS, L. B. F. M. Unusual Features of the 1-4 Micron Spectrum of HR 4049. *T. R. Geballe, K. S. Noll, D. C. B. Whittet, and L. B. F. M. Waters.* **340**, L29, 75-E9 (1989)
- WATSON, WILLIAM D. Interacting Masers and the Extreme Brightness of Astrophysical Water Masers. *Shuji Deguchi and William D. Watson.* **340**, L17, 75-D11 (1989)
- WEBB, G. M. The Diffusion Approximation and Transport Theory for Cosmic Rays in Relativistic Flows. *G. M. Webb.* **340**, 1112, 82-B1 (1989)
- WEBB, J. R. Multifrequency Observations of Blazars. III. The Spectral Shape of the Radio to X-Ray Continuum. *L. M. J. Brown, E. I. Robson, W. K. Gear, D. H. Hughes, M. J. Griffin, B. J. Geldzahler, P. R. Schwartz, M. G. Smith, A. G. Smith, D. W. Shepherd, J. R. Webb, E. Valtaoja, H. Terasanta, and E. Salonen.* **340**, 129, 68-F8 (1989)
- WEBBER, W. R. The Abundances of ^{14}N at the Cosmic-Ray Source: A Study Using New Fragmentation Cross Sections. *M. Gupta and W. R. Webber.* **340**, 1124, 82-C1 (1989)
- WEINBERG, DAVID H. The Topology of Large-Scale Structure. III. Analysis of Observations. *J. Richard Gott III, John Miller, Trinh X. Thuan, Stephen E. Schneider, David H. Weinberg, Charles Gammie, Kevin Polk, Michael Vogeley, Scott Jeffrey, Suketu P. Bhavsar, Adrian L. Melott, Riccardo Giovanelli, Martha P. Haynes, R. Brent Tully, and Andrew J. S. Hamilton.* **340**, 625, 76-C1 (1989)
- The Area of Isodensity Contours in Cosmological Models and Galaxy Surveys. *Barbara S. Ryden, Adrian L. Melott, David A. Craig, J. Richard Gott III, David H. Weinberg, Robert J. Scherrer, Suketu P. Bhavsar, and John M. Miller.* **340**, 647, 76-E1 (1989)
- WEINTRAUB, DAVID A. Submillimeter Measurements of T Tauri and FU Orionis Stars. *David A. Weintraub, G. Sandell, and W. D. Duncan.* **340**, L69, 83-C10 (1989)
- WHITE, TIMOTHY R. Hot Accretion Disks with Electron-Positron Pairs. *Timothy R. White and Alan P. Lightman.* **340**, 1024, 81-F9 (1989)
- WHITEOAK, J. B. Detection of the $2_0 \rightarrow 3_{-1}$ Transition of $^{13}\text{C}_2\text{H}_5\text{OH}$ at 14.8 GHz. *T. B. H. Kuiper, W. L. Peters III, F. F. Gardner, J. B. Whiteoak, and J. E. Reynolds.* **340**, L41, 75-F9 (1989)
- WHITTET, D. C. B. Unusual Features of the 1-4 Micron Spectrum of HR 4049. *T. R. Geballe, K. S. Noll, D. C. B. Whittet, and L. B. F. M. Waters.* **340**, L29, 75-E9 (1989)
- WILKING, BRUCE A. IRAS Observations of the ρ Ophiuchi Infrared Cluster: Spectral Energy Distributions and Luminosity Function. *Bruce A. Wilking, Charles J. Lada, and Erick T. Young.* **340**, 823, 78-F3 (1989)
- WILSON, T. L. H_2CO Maps of High-Density Molecular Fragments 3' North of Orion-KL. *T. L. Wilson and K. J. Johnston.* **340**, 894, 79-E1 (1989)
- WITTEBORN, F. C. Infrared Emission from Comets. *K. S. Krishna Swamy, S. A. Sandford, L. J. Allamandola, F. C. Witteborn, and J. D. Bregman.* **340**, 537, 73-G11 (1989)
- WOOD, DOUGLAS O. S. Massive Stars Embedded in Molecular Clouds: Their Population and Distribution in the Galaxy. *Douglas O. S. Wood and Ed Churchwell.* **340**, 265, 70-C10 (1989)
- WU, YUEFANG. A Reexamination of the Energetics of Molecular Clouds. *Yuefang Wu and Neal J. Evans II.* **340**, 307, 70-G5 (1989)
- YAHIL, A. Analysis of the Neutrino Events from Supernova 1987A. *James M. Lattimer and A. Yahil.* **340**, 426, 72-E1 (1989)
- YOUNG, ERICK T. IRAS Observations of the ρ Ophiuchi Infrared Cluster: Spectral Energy Distributions and Luminosity Function. *Bruce A. Wilking, Charles J. Lada, and Erick T. Young.* **340**, 823, 78-F3 (1989)
- YUAN, CHI. Resonance Excitation of Spiral Density Waves in a Gaseous Disk. I. A Linear Theory. *Chi Yuan and Ye Cheng.* **340**, 216, 69-F11 (1989)
- ZENSUS, J. A. Superluminal Motion in the Quasar 3C 279. *S. C. Unwin, M. H. Cohen, J. A. Biretta, M. W. Hodges, and J. A. Zensus.* **340**, 117, 68-E6 (1989)
- ZHAN, YIN. Gravitational Clustering of Galaxies: The Probability Distribution Function. *Yin Zhan.* **340**, 23, 67-C4 (1989)
- ZIRIN, HAROLD. Observations of the 12 Micron Mg I Lines in Various Solar Features. *Harold Zirin and Bruce Popp.* **340**, 571, 74-C9 (1989)
- ZWEIBEL, ELLEN G. Magnetic Reconnection in Partially Ionized Gases. *Ellen G. Zweibel.* **340**, 550, 74-A12 (1989)

THE ASTROPHYSICAL JOURNAL
CONTENTS OF VOLUME 340, PART 1

1989 MAY 1, Number 1

| | Page | Fiche |
|--|------|--------|
| MOCK GRAVITY AND COSMIC STRUCTURE..... <i>Craig J. Hogan</i> | 1 | 67-A8 |
| VOID STATISTICS, SCALING, AND THE ORIGINS OF LARGE-SCALE STRUCTURE <i>J. N. Fry, Riccardo Giovanelli, Martha P. Haynes, Adrian L. Melott, and Robert J. Scherrer</i> | 11 | 67-B4 |
| GRAVITATIONAL CLUSTERING OF GALAXIES: THE PROBABILITY DISTRIBUTION FUNCTION <i>Yin Zhan</i> | 23 | 67-C4 |
| THE CLUSTERING OF DWARF GALAXIES <i>Jo Ann Eder, James M. Schombert, Avishai Dekel, and Augustus Oemler, Jr.</i> | 29 | 67-C10 |
| MERGERS AND BIAS IN A COLD DARK MATTER COSMOLOGY <i>R. G. Carlberg and H. M. P. Couchman</i> | 47 | 67-E7 |
| DYNAMICS OF SUPERCLUSTERS: RECONCILING $\Omega_0 = 1.0$ WITH OBSERVATIONS? <i>Yehuda Hoffman</i> | 69 | 67-G3 |
| FAINT IDENTIFICATIONS OF "1 JANSKY" RADIO SOURCE EMPTY FIELDS: RADIO GALAXIES AT HIGH REDSHIFT <i>S. J. Lilly</i> | 77 | 68-A1 |
| THE EVOLUTION OF LOW-IONIZATION QSO ABSORPTION SYSTEMS <i>Adeline Caulet</i> | 90 | 68-B6 |
| SUPERLUMINAL MOTION IN THE QUASAR 3C 279 <i>S. C. Unwin, M. H. Cohen, J. A. Biretta, M. W. Hodges, and J. A. Zensus</i> | 117 | 68-E6 |
| MULTIFREQUENCY OBSERVATIONS OF BLAZARS. III. THE SPECTRAL SHAPE OF THE RADIO TO X-RAY CONTINUUM <i>L. M. J. Brown, E. I. Robson, W. K. Gear, D. H. Hughes, M. J. Griffin, B. J. Geldzahler, P. R. Schwartz, M. G. Smith, A. G. Smith, D. W. Shepherd, J. R. Webb, E. Valtaoja, H. Terasanta, and E. Salonen</i> | 129 | 68-F4 |
| MULTIFREQUENCY OBSERVATIONS OF BLAZARS. IV. THE VARIABILITY OF THE RADIO TO ULTRAVIOLET CONTINUUM..... <i>L. M. J. Brown, E. I. Robson, W. K. Gear, and M. G. Smith</i> | 150 | 69-A2 |
| THE RADIATIVE DECELERATION OF ULTRARELATIVISTIC JETS IN ACTIVE GALACTIC NUCLEI <i>Fulvio Melia and Ariele Königl</i> | 162 | 69-B5 |
| BULK ACCELERATION IN RELATIVISTIC JETS AND THE SPECTRAL PROPERTIES OF BLAZARS <i>Gabriele Ghisellini and Laura Maraschi</i> | 181 | 69-C13 |
| SPECTROPOLARIMETRY AND VARIABILITY OF SEYFERT 1.8 AND 1.9 GALAXIES <i>Robert W. Goodrich</i> | 190 | 69-D10 |
| EFFECTS OF ELECTRON-POSITRON PAIRS ON ACCRETION FLOWS <i>Bradley G. Tritz and Sachiko Tsuruta</i> | 203 | 69-E9 |
| RESONANCE EXCITATION OF SPIRAL DENSITY WAVES IN A GASEOUS DISK. I. A LINEAR THEORY <i>Chi Yuan and Ye Cheng</i> | 216 | 69-F11 |
| THE "RED GIANT CLOCK" AS AN INDICATOR FOR THE EFFICIENCY OF CENTRAL MIXING IN HORIZONTAL-BRANCH STARS <i>F. Caputo, V. Castellani, A. Chieffi, L. Pulone, and A. Tornambé</i> | 241 | 70-A10 |
| THE CORE MASS AT THE HELIUM FLASH: INFLUENCE OF NUMERICAL AND PHYSICAL INPUTS <i>I. Mazzitelli</i> | 249 | 70-B6 |
| MILLION DEGREE GAS IN THE GALACTIC HALO AND THE LARGE MAGELLANIC CLOUD. II. THE LINE OF SIGHT TO SUPERNOVA 1987A <i>Max Pettini, Raylee Sthakias, Sandro D'Odorico, Paolo Molaro, and Giovanni Vladilo</i> | 256 | 70-C1 |
| MASSIVE STARS EMBEDDED IN MOLECULAR CLOUDS: THEIR POPULATION AND DISTRIBUTION IN THE GALAXY <i>Douglas O. S. Wood and Ed Churchwell</i> | 265 | 70-C10 |
| INTERSTELLAR C ₂ , CH, AND CN IN TRANSLUCENT MOLECULAR CLOUDS <i>Ewine F. van Dishoeck and John H. Black</i> | 273 | 70-D8 |
| VELOCITY FIELD IN THE FRAGMENTED MOLECULAR CLOUD CORE OF W3: EVIDENCE FOR LARGE-SCALE TURBULENCE <i>Masahiko Hayashi, Hideyuki Kobayashi, and Tetsuo Hasegawa</i> | 298 | 70-F10 |

| | Page | Fiche |
|--|---|------------|
| A REEXAMINATION OF THE ENERGETICS OF MOLECULAR CLOUDS | Yuefang Wu and Neal J. Evans II | 307 70-G5 |
| PREDICTING PECULIAR INTERSTELLAR EXTINCTION FROM GASEOUS ABUNDANCES | Charles L. Joseph, Theodore P. Snow, Jr., and G. Gregory Seab | 314 71-A1 |
| GLOBAL ASPECTS OF THE NGC 6334 STAR FORMATION COMPLEX: AN INFRARED SURVEY | Steven M. Straw and A. R. Hyland | 318 71-A5 |
| FLASH-PHOTOIONIZED NEBULAE | J. I. Katz | 344 71-C11 |
| DIFFUSIVE SHOCK ACCELERATION OF COSMIC RAYS AND GAMMA RADIATION FROM YOUNG SUPERNOVA SHELLS | V. S. Berezinsky and V. S. Ptuskin | 351 71-D6 |
| THREE FIELDS CONTAINING YOUNG PULSARS: THE OBSERVABLE LIFETIME OF SUPERNOVA REMNANTS | Robert Braun, W. Miller Goss, and Andrew G. Lyne | 355 71-D11 |
| OPTICAL IMAGERY AND SPECTROPHOTOMETRY OF CTB 80 | J. Jeff Hester and Shrinivas R. Kulkarni | 362 71-E4 |
| HYDROGEN AS A TEST OF TYPE Ia SUPERNOVA PROGENITOR MODELS | James H. Applegate and James L. Terman | 380 72-A5 |
| NEUTRINO TRANSPORT AND THE PROMPT MECHANISM FOR TYPE II SUPERNOVAE | Eric S. Myra and Sidney A. Bludman | 384 72-A9 |
| THE LATE BEHAVIOR OF SUPERNOVA 1987A. I. THE LIGHT CURVE | W. David Arnett and Albert Fu | 396 72-B9 |
| THE LATE BEHAVIOR OF SUPERNOVA 1987A. II. GAMMA-RAY TRANSPARENCY OF THE EJECTA | Albert Fu and W. David Arnett | 414 72-D1 |
| ANALYSIS OF THE NEUTRINO EVENTS FROM SUPERNOVA 1987A | James M. Lattimer and A. Yahil | 426 72-E1 |
| MEASUREMENTS OF THE DIAMETER OF THE LARGE MAGELLANIC CLOUD SUPERNOVA SN 1987A | M. Karovska, L. Koehlin, P. Nisenson, C. Papaliolios, and C. Standley | 435 72-E12 |
| HIGH-ENERGY GAMMA-RAY ABSORPTION IN RELATIVISTIC MAGNETOSPHERES ... | H. Riffert, P. Mészáros, and Z. Bagoly | 443 72-F8 |
| GAMMA-RAY BURSTER COUNTERPARTS: RADIO | Bradley E. Schaefter, Thomas L. Cline, J.-L. Atteia, C. Barat, U. D. Desai, I. V. Estulin, W. D. Evans, E. E. Fenimore, K. Hurley, R. W. Klebesadel, A. V. Kuznetsov, J. G. Laros, M. Niel, and B. J. Teegarden | 455 72-G9 |
| RADIAL VELOCITY STUDIES AND ABSOLUTE PARAMETERS OF CONTACT BINARIES. II. OO AQUILAE | Bruce J. Hrivnak | 458 73-A1 |
| EROSION OF CIRCUMSTELLAR PARTICLE DISKS BY INTERSTELLAR DUST | Jack J. Lissauer and Caitlin A. Griffith | 468 73-B1 |
| HIGH-RESOLUTION CO OBSERVATIONS OF YOUNG LOW-MASS STARS | S. Terebey, S. N. Vogel, and P. C. Myers | 472 73-B5 |
| ENVELOPE STRUCTURES AND OPTICAL/RADIO POSITIONS OF COOL STARS | P. F. Bowers, K. J. Johnston, and C. de Vegt | 479 73-C1 |
| AN ANALYSIS OF THE PRECESSION OF THE ACCRETION DISK OF HERCULES X-1 | Guo-jun Qiao and Jiu-heng Cheng | 503 73-D11 |
| STELLAR WIND DURING HELIUM NOVA OUTBURST | Mariko Kato, Hideyuki Saio, and Izumi Hachisu | 509 73-E5 |
| A SURVEY OF RADIO EMISSION FROM GALACTIC OB STARS | J. H. Bieging, David C. Abbott, and E. B. Churchwell | 518 73-F1 |
| INFRARED EMISSION FROM COMETS | K. S. Krishna Swamy, S. A. Sandford, L. J. Allamandola, F. C. Witteborn, and J. D. Bregman | 537 73-G11 |
| MAGNETIC RECONNECTION IN PARTIALLY IONIZED GASES | Ellen G. Zweibel | 550 74-A12 |
| SPONTANEOUS FORMATION OF ELECTRIC CURRENT SHEETS BY THE EXPULSION OF MAGNETIC FLUX | B. C. Low | 558 74-B8 |
| OBSERVATIONS OF THE 12 MICRON Mg I LINES IN VARIOUS SOLAR FEATURES | Harold Zirin and Bruce Popp | 571 74-C9 |
| THE NONUNIFORM MAGNETOHYDRODYNAMIC NATURE OF THE SOLAR CORONA. II. GENERALIZATION OF BASIC SOLUTIONS | A. de Ville and E. R. Priest | 579 74-D5 |
| TURBULENT POWER AND DISSIPATION IN THE SOLAR TRANSITION ZONE | Kenneth P. Dere | 599 74-F1 |
| THE SPATIAL SCALES AND RISE TIMES OF IMPULSIVE SOLAR BURST SOURCES | David Batchelor | 607 74-F11 |
| ORIGIN OF HEAVY XENON IN METEORITIC DIAMONDS | Donald D. Clayton | 613 74-G5 |
| THEORETICAL STUDY OF THE DIPOLE MOMENT FUNCTION OF THE $\lambda^2\Sigma^*$ STATE OF CN | Stephen R. Langhoff and Charles W. Bauschlicher, Jr. | 620 75-A1 |

CONTENTS

v

ERRATUM

GALACTIC INTERSTELLAR ABUNDANCE SURVEYS WITH IUE. III. SILICON, MANGANESE, IRON, SULFUR, AND ZINC

Michael E. Van Steenberg and J. Michael Shull

Page Fiche

624 75-A9

INSTRUCTIONS TO AUTHORS

i 75-A12

1989 MAY 15, Number 2

THE TOPOLOGY OF LARGE-SCALE STRUCTURE. III. ANALYSIS OF OBSERVATIONS

J. Richard Gott III, John Miller, Trinh X. Thuan, Stephen E. Schneider, David H. Weinberg, Charles Gammie, J. Richard Gott III, John Miller, Trinh X. Thuan, Stephen E. Schneider, David H. Weinberg, Charles Gammie, Kevin Polk, Michael Vogeley, Scott Jeffrey, Suketu P. Bhavsar, Adrian L. Melott, Riccardo Giovanelli, Martha P. Haynes, R. Brent Tully, and Andrew J. S. Hamilton

625 76-C1

THE AREA OF ISODENSITY CONTOURS IN COSMOLOGICAL MODELS AND GALAXY SURVEYS

Barbara S. Ryden, Adrian L. Melott, David A. Craig, J. Richard Gott III, David H. Weinberg, Robert J. Scherrer, Suketu P. Bhavsar, and John M. Miller

647 76-E1

A SEARCH FOR DIFFUSE LIGHT IN A RICHNESS 4 CLUSTER OF GALAXIES

Donald H. Gudehus

661 76-F1

THE EVOLUTION OF COOLING FLOWS: SELF-SIMILAR COOLING WAVES

Edmund Bertschinger

666 76-F7

EXTRAGALACTIC JETS AS CURRENT CARRYING SYSTEMS. II. MAGNETOHYDRODYNAMIC TURBULENCE, RELATIVISTIC ELECTRON DISTRIBUTION, AND OBSERVABLE QUANTITIES

Edvige Corbelli and Pie-luigi Veltri

679 76-G7

HIGH-RESOLUTION, HIGH DYNAMIC RANGE VLA IMAGES OF THE M87 JET AT 2 CENTIMETERS

Frazer N. Owen, Philip E. Hardee, and T. J. Cornwell

698 77-B1

A REEVALUATION OF THE INFRARED-RADIO CORRELATION FOR SPIRAL GALAXIES

Nicholas A. Devereux and Stephen A. Eales

708 77-C1

OPTICALLY THIN GAS IN THE BROAD-LINE REGION OF SEYFERT GALAXIES

Simon L. Morris and Martin J. Ward

713 77-C6

AN INFRARED STUDY OF STARBURSTS IN THE INTERACTING GALAXY PAIR ARP 299 (NGC 3690 + IC 694)

Takao Nakagawa, Tetsuya Nagata, T. R. Geballe, Haruyuki Okuda, Hiroshi Shibai, and Hideo Matsuhara

729 77-E1

POPULATION STUDIES. VII. ON THE USE OF *UBV* DATA FOR KINEMATICALLY SELECTED SAMPLES TO DETERMINE THE DEPENDENCE OF KINEMATICS ON ABUNDANCE

John E. Norris and Sean G. Ryan

739 77-F1

THE DENSITY DISTRIBUTION OF REFRACTORY ELEMENTS AWAY FROM THE GALACTIC PLANE

Richard J. Edgar and Blair D. Savage

762 78-A1

OBSERVATIONAL CONSTRAINTS ON AN EMBEDDED CLOUD MODEL FOR THE SOFT X-RAY DIFFUSE BACKGROUND

D. N. Burrows

775 78-B3

ON THE GRAVITATIONAL COLLAPSE OF DECELERATING SHOCKED LAYERS IN OB ASSOCIATIONS

Bruce G. Elmegreen

786 78-C1

PHOTOGRAPHIC, NEAR-INFRARED, AND CCD PHOTOMETRY OF THE DISTANT GLOBULAR CLUSTER AM-1

Barry F. Madore and Wendy L. Freedman

812 78-E1

IRAS OBSERVATIONS OF THE ρ OPHIUCHI INFRARED CLUSTER: SPECTRAL ENERGY DISTRIBUTIONS AND LUMINOSITY FUNCTION

Bruce A. Wilking, Charles J. Lada, and Erick T. Young

823 78-F3

STOCHASTIC EVOLUTION OF REFRACTORY INTERSTELLAR DUST DURING THE CHEMICAL EVOLUTION OF A TWO-PHASE INTERSTELLAR MEDIUM

Kurt Liffman and Donald D. Clayton

853 79-B1

FAST MOLECULAR SHOCKS. I. REFORMATION OF MOLECULES BEHIND A DISSOCIATIVE SHOCK

David A. Neufeld and A. Dalgarno

869 79-C3

H₂CO MAPS OF HIGH-DENSITY MOLECULAR FRAGMENTS 3' NORTH OF ORION-KL

T. L. Wilson and K. J. Johnston

894 79-E1

THE ABSENCE OF INTERSTELLAR HCCO AND THE BATES DISSOCIATIVE RECOMBINATION THEORY

B. E. Turner and Trevor J. Sears

900 79-E7

DEUTERIUM FRACTIONATION IN DENSE INTERSTELLAR CLOUDS

T. J. Millar, A. Bennett, and Eric Herbst

906 79-F1

| | Page | Fiche |
|---|--|------------|
| THE IONIZATION STRUCTURE OF PLANETARY NEBULAE. IX. NGC 1535 | Timothy Barker | 921 79-G7 |
| EARLY SHAPING OF ASYMMETRICAL PLANETARY NEBULAE | Noam Soker | 927 80-A1 |
| VLA OBSERVATIONS OF CIRCUMNEBULAR NEUTRAL HYDROGEN IN IC 418 ... | A. R. Taylor, G. T. Gussie, and W. M. Goss | 932 80-A6 |
| MYSTERY SPOT IN SUPERNOVA 1987A: REFLECTION OR FLUORESCENCE BY AN INTERSTELLAR CLOUD? James E. Felten, Eli Dwek, and Sueli M. Viegas-Aldrovandi | | 943 80-B2 |
| GAMMA-RAY LINES PRODUCED BY LOW-ENERGY COSMIC RAYS IN SN 1987A Toshikazu Ebisuzaki, Yoshiyuki Takahashi, and Noriaki Shibazaki | | 950 80-B9 |
| THE PROMPT-SHOCK SUPERNOVA MECHANISM. I. THE EFFECT OF THE FREE-PROTON MASS FRACTION AND THE NEUTRINO TRANSPORT ALGORITHM | Stephen W. Bruenn | 955 80-C1 |
| NEUTRON PRODUCTION AND NEUTRON-CAPTURE NUCLEOSYNTHESIS IN A LOW-MASS, LOW-METALLICITY ASYMPTOTIC GIANT BRANCH STAR | David Hollowell and Icko Iben, Jr. | 966 80-D1 |
| MODELING THE CLASSICAL NOVA OUTBURST. I. EXPLORING THE PHYSICS OF A NEW MECHANISM G. Siegfried Kutter and Warren M. Sparks | | 985 80-E6 |
| HOW MUCH BOUNDARY LAYER HEATING OCCURS IN AN ACCRETING PRENOVA WHITE DWARF? Oded Regev and Michael M. Shara | | 1006 80-G1 |
| THE RELATION BETWEEN X-RAY EMISSION AND ROTATION IN LATE-TYPE STARS FROM THE PERSPECTIVE OF X-RAY SELECTION | Thomas A. Fleming, Isabella M. Gioia, and Tommaso Maccacaro | 1011 80-G8 |
| HOT ACCRETION DISKS WITH ELECTRON-POSITRON PAIRS | Timothy R. White and Alan P. Lightman | 1024 81-A9 |
| HIGHLY IONIZED SPECIES AND CIRCUMSTELLAR SHELLS IN B8-A1 STARS Frederick C. Bruhweiler, C. A. Grady, and Weihsueh A. Chiu | | 1038 81-C1 |
| BOWEN FLUORESCENCE IN SCORPIUS X-1 | Jonathan Schachter, Alexei V. Filippenko, and Steven M. Kahn | 1049 81-D1 |
| ON THE DYNAMICS OF MASS TRANSFER OVER AN ACCRETION DISK | Stephen H. Lubow | 1064 81-E2 |
| PHOTOSPHERES OF HOT STARS. III. LUMINOSITY EFFECTS AT SPECTRAL TYPE O9.5 Stephen A. Voels, Bruce Bohannon, David C. Abbott, and D. G. Hummer | | 1073 81-F1 |
| AN INTERPRETATION OF THE LINE PROFILE VARIATIONS IN THE IUE SPECTRUM OF THE WOLF-RAYET BINARY γ_2 VELORUM | Estela Brandi, Osvaldo E. Ferrer, and Jorge Sahade | 1091 81-G6 |
| ANGULAR DIAMETER MEASUREMENTS OF 24 GIANT AND SUPERGIANT STARS FROM THE MARK III OPTICAL INTERFEROMETER D. J. Hutter, K. J. Johnston, D. Mozurkewich, R. S. Simon, M. M. Colavita, Pan X. P., M. Shao, B. E. Hines, D. H. Staelin, J. L. Hershey, J. A. Hughes, and G. H. Kaplan | | 1103 82-A5 |
| THE DIFFUSION APPROXIMATION AND TRANSPORT THEORY FOR COSMIC RAYS IN RELATIVISTIC FLOWS | G. M. Webb | 1112 82-B1 |
| THE ABUNDANCE OF ^{14}N AT THE COSMIC-RAY SOURCE: A STUDY USING NEW FRAGMENTATION CROSS SECTIONS M. Gupta and W. R. Webber | | 1124 82-C1 |
| SOLAR Si III LINE RATIOS FROM THE HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH ON BOARD SPACELAB 2: THE EFFECTS OF NON-MAXWELLIAN ELECTRON DISTRIBUTION FUNCTIONS F. P. Keenan, J. W. Cook, P. L. Dufton, and A. E. Kingston | | 1135 82-D1 |
| THE STRUCTURE AND WAVELENGTH OF SOME Pt II LINES OF ASTROPHYSICAL INTEREST | Rolf Engleman, Jr. | 1140 82-D6 |
| ABSTRACTS OF THE ASTROPHYSICAL JOURNAL SUPPLEMENT SERIES, 1989 JUNE ISSUE | | |
| MILLIMETER, CENTIMETER, AND CARBON MONOXIDE OBSERVATIONS OF RADIO-QUIET QUASARS AND LUMINOUS SEYFERT 1 GALAXIES DETECTED BY IRAS | Richard Barvainis and Robert Antonucci | 1144 82-E1 |
| THE WASILEWSKI SAMPLE OF EMISSION-LINE GALAXIES: FOLLOW-UP CCD IMAGING AND SPECTROSCOPIC AND IRAS OBSERVATIONS Gregory D. Bothun, Jules P. Halpern, Carol J. Lonsdale, Chris Impey, and Mark Schmitz | | 1144 82-E1 |
| INTERSTELLAR MATTER IN EARLY-TYPE GALAXIES. I. IRAS FLUX DENSITIES | G. R. Knapp, P. Guhathakurta, D.-W. Kim, and M. Jura | 1145 82-E2 |
| ERROR ANALYSIS OF A TREE CODE | Joshua E. Barnes and Piet Hut | 1145 82-E2 |
| TREESPH: A UNIFICATION OF SPH WITH THE HIERARCHICAL TREE METHOD | Lars Hernquist and Neal Katz | 1146 82-E3 |
| INDEX TO VOLUME 340, PARTS 1 AND 2 | | See Part 2 |

THE ASTROPHYSICAL JOURNAL LETTERS

CONTENTS OF VOLUME 340, PART 2

1989 MAY 1, Number 1

| | Page | Fiche |
|---|------|-------------------|
| THE PROPERTIES OF INFRARED COLOR-SELECTED QUASARS F. J. Low, R. M. Cutri, S. G. Kleinmann, and J. P. Huchra | L1 | 75-C6 |
| THE CONNECTION BETWEEN ACTIVE AND NORMAL GALAXIES A. Cavaliere and P. Padovani | L5 | 75-C11 |
| MOLECULAR GAS IN THE POWERFUL RADIO GALAXIES PERSEUS A AND 4C 12.50 I. F. Mirabel, D. B. Sanders, and I. Kazès | L9 | 75-D1 |
| ATOMIC HYDROGEN IN THE POWERFUL RADIO-INFRARED GALAXIES 4C 12.50 AND 3C 433 I. F. Mirabel | L13 | 75-D6 |
| INTERACTING MASERS AND THE EXTREME BRIGHTNESS OF ASTROPHYSICAL WATER MASERS Shuji Deguchi and William D. Watson | L17 | 75-D11 |
| DETECTION OF A STRONG EXCESS NOISE COMPONENT IN THE LOW STATE OF 4U 1705-44 A. Langmeier, G. Hasinger, and J. Trümper | L21 | 75-E1 |
| DISCOVERY OF OPTICAL EMISSION FROM THE REMNANT OF SN 1957D IN M83 Knox S. Long, William P. Blair, and Wojciech Krzeminski | L25 | 75-E4 |
| UNUSUAL FEATURES OF THE 1-4 MICRON SPECTRUM OF HR 4049 T. R. Geballe, K. S. Noll, D. C. B. Whittet, and L. B. F. M. Waters | L29 | 75-E9 |
| THE TEMPERATURE DEPENDENCE OF THE CO INFRARED BAND STRENGTH IN CO:H ₂ O ICES B. Schmitt, J. Mayo Greenberg, and R. J. A. Grim | L33 | 75-F1 |
| FIRST DETECTION OF SO ₂ AND CH ₃ OH EMISSION AND ONE UNIDENTIFIED LINE NEAR 800 GHz J. Stutzki, R. Genzel, U. U. Graf, A. I. Harris, and D. T. Jaffe | L37 | 75-F5 |
| DETECTION OF THE 2 ₀ →3 ₋₁ TRANSITION OF ¹³ CH ₃ OH AT 14.8 GHz T. B. H. Kuiper, W. L. Peters III, F. F. Gardner, J. B. Whiteoak, and J. E. Reynolds | L41 | 75-F9 |
| INSTRUCTIONS TO AUTHORS OF LETTERS | | Inside Back Cover |

1989 MAY 15, Number 2

| | Page | Fiche |
|---|------|--------|
| EXTRAGALACTIC INFRARED BACKGROUNDS, POLARIZATION, AND UNIVERSAL MAGNETIC FIELD Paolo de Bernardis, Silvia Masi, Francesco Melchiorri, and Giovanni Moreno | L45 | 83-A10 |
| VLBI OBSERVATIONS OF THE OH MEGAMASER IN IC 4553 (ARP 220) P. J. Diamond, R. P. Norris, W. A. Baan, and R. S. Booth | L49 | 83-B1 |
| THE RATIO OF MOLECULAR TO ATOMIC GAS IN INFRARED LUMINOUS GALAXIES I. F. Mirabel and D. B. Sanders | L53 | 83-B5 |
| EVIDENCE FOR CLUSTERING OF FIELD HORIZONTAL-BRANCH STARS IN THE GALACTIC HALO Steve P. Doinidis and Timothy C. Beers | L57 | 83-B10 |
| LIMITS ON AN OPTICAL PULSAR IN SUPERNOVA 1987A C. R. Pennypacker, J. A. Kristian, J. Middleditch, M. A. Hamuy, J. N. Imamura, W. E. Kunkel, D. E. Morris, R. A. Muller, S. Perlmutter, S. J. Rawlings, T. P. Sasseen, I. K. Shelton, T. Y. Steiman-Cameron, and I. R. Tuohy | L61 | 83-C1 |
| DISCOVERY OF BROAD-BAND OPTICAL CIRCULAR POLARIZATION IN ALPHA LEONIS G. D. Henson, J. C. Kemp, D. J. Kraus, and D. J. Jenkins | L65 | 83-C5 |
| SUBMILLIMETER MEASUREMENTS OF T TAURI AND FU ORIONIS STARS David Weintraub, G. Sandell, and W. D. Duncan | L69 | 83-C10 |

CONTENTS

| | <i>Page</i> | <i>Fiche</i> |
|---|-------------|--------------------------|
| RADIO EMISSION FROM SYMBIOTIC VARIABLES: CI CYGNI, Z ANDROMEDAE, AND EG ANDROMEDAE—TEMPORAL VARIABILITY AS CLUES TO THE NATURE OF SYMBIOTICS..... <i>Michael V. Torbett and Bel Campbell</i> | L73 | 83-D1 |
| INDEX TO VOLUME 340, PARTS 1 AND 2 | i | 76-B1 |
| INSTRUCTIONS TO AUTHORS OF <i>LETTERS</i> | | <i>Inside Back Cover</i> |

